

Improving Transportation Efficiency

Survey of New Perspectives and Innovative Tools

**King Cushman, Director Transportation and Growth Planning
Puget Sound Regional Council (MPO - Seattle, Washington)**

Land Use & Transportation in Metropolitan Planning Process

Lincoln Institute Seminar - May 14, 2002

The story...

- ▶ A “growing” problem
- ▶ Travel and land development connections
- ▶ Old lessons and new tools
- ▶ Talking about money

A Growing Problem?

**Transportation and growth are increasingly
embedded in public consciousness**

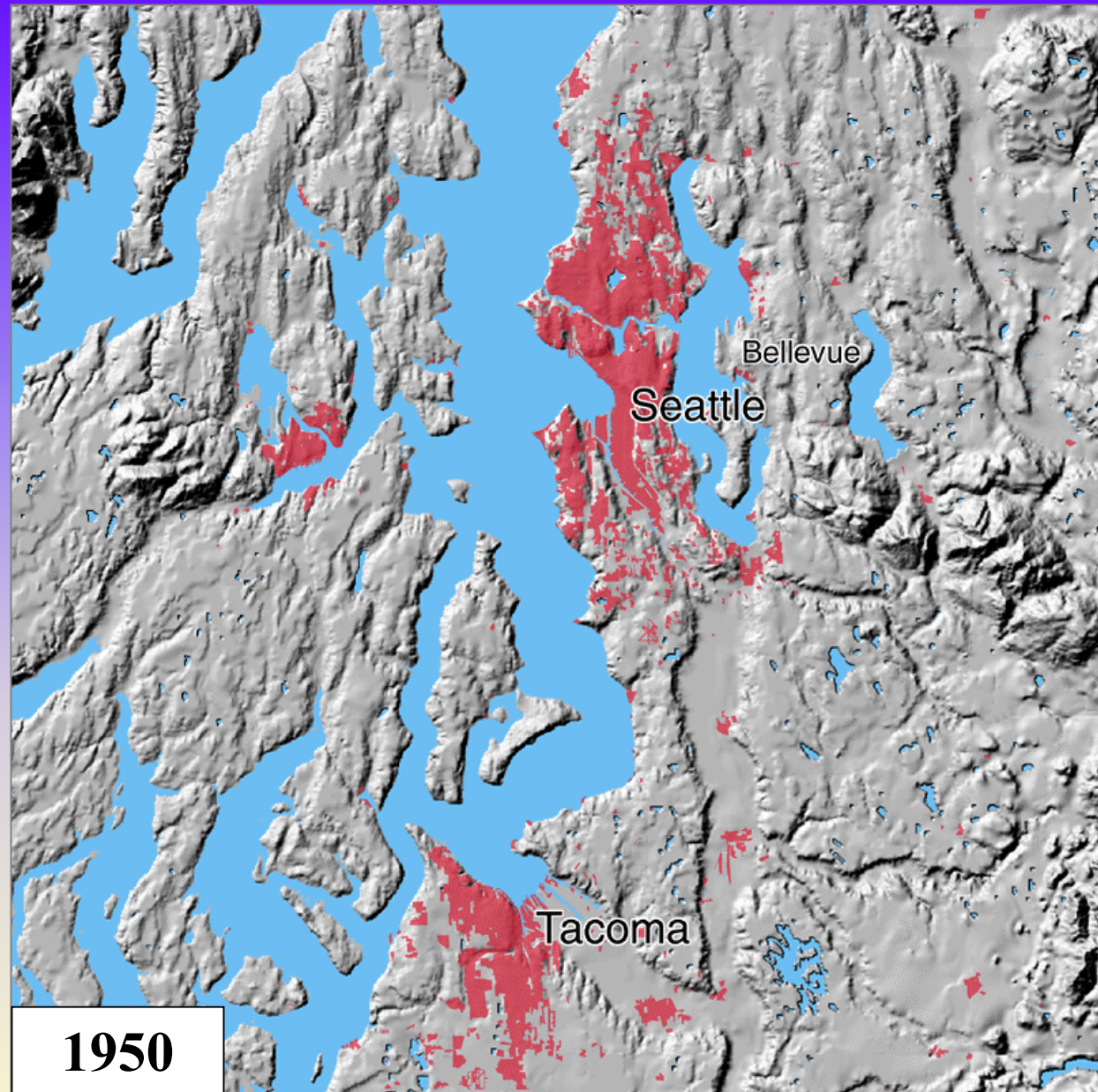
The “Evil” Elements...

- ▶ Traffic... *lots of it!*
- ▶ Lost *livability* & loss of local character...*what happened to “main street” and farmlands?*
- ▶ Economic “gridlock”...*some corporations & industries have moved, or threaten to “move out”*
- ▶ Imbalanced urban infrastructure investments...*lack of connection between public policies and market strategies as part of total solution*



Central Puget Sound's Expanding Urban Footprint

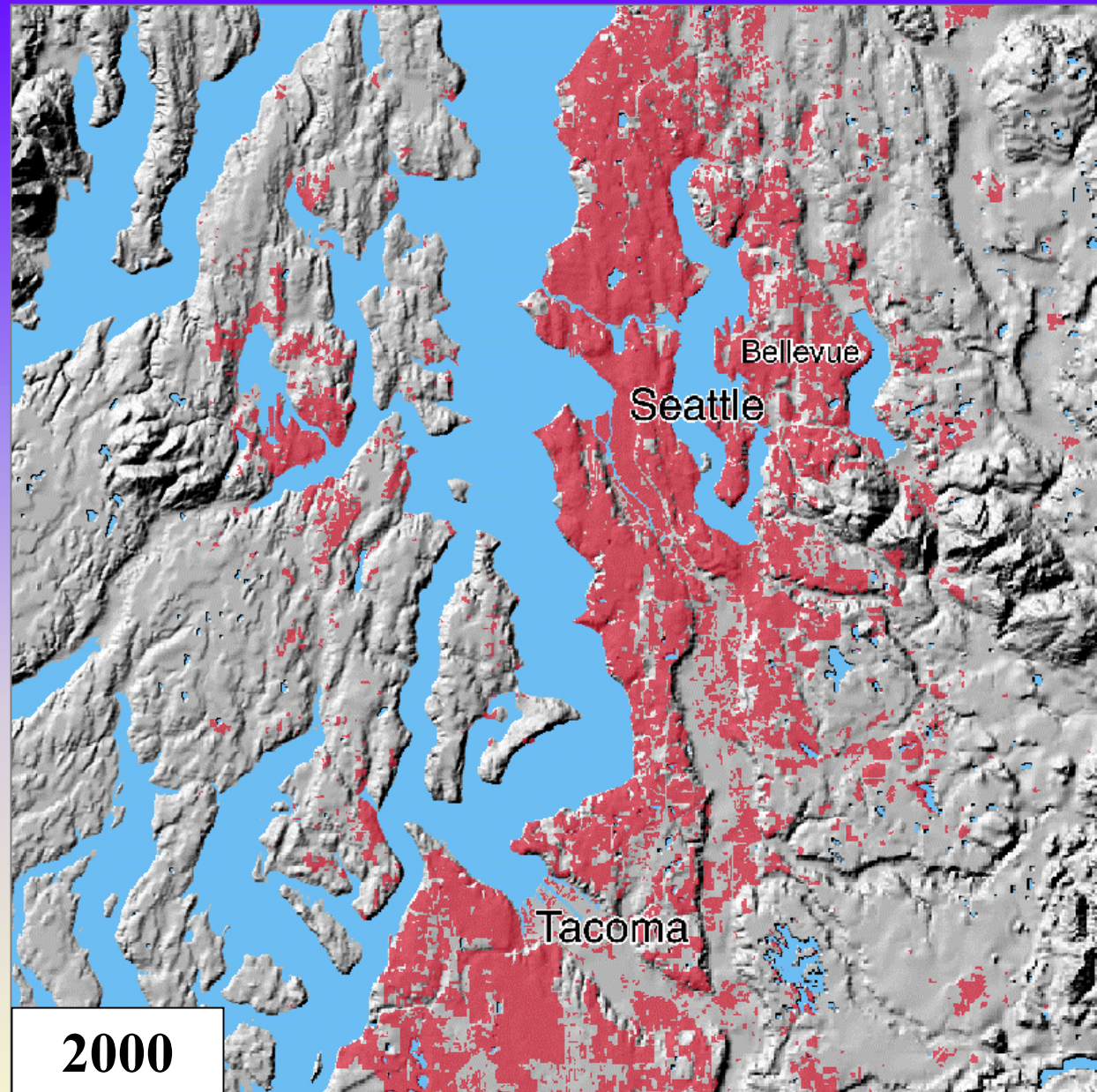
Improving Transportation Efficiency



USGS Urban Hazards, David Catts (2000)

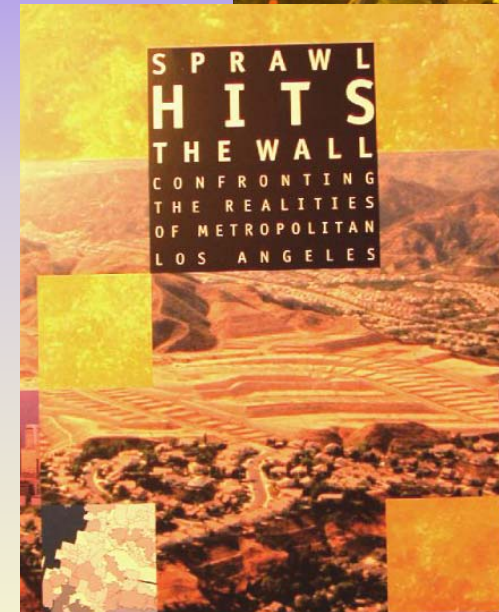
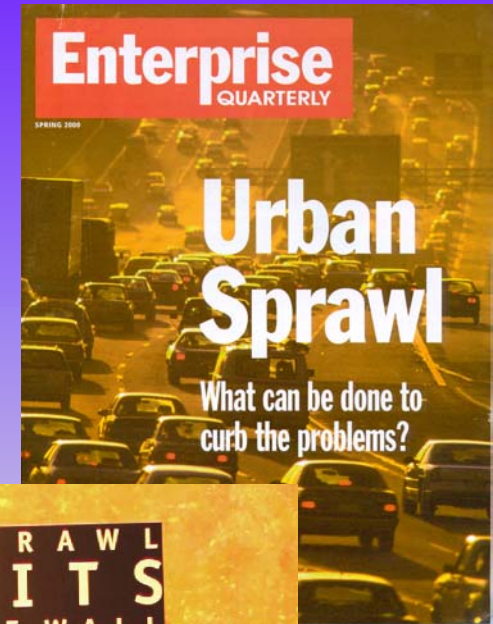
Central Puget Sound's Expanding Urban Footprint

Improving Transportation Efficiency



USGS Urban Hazards, David Catts (2000)

Public Frustration with Style of Growth...



Public Perceptions... *metropolitan USA*



Bottom line?

Supply and Demand Out of Balance



Basic (Market) Fundamentals

- ▶ Peak travel ***demand*** far exceeds roadway ***supply***...
- ▶ Consumers travel ***benefits*** exceed ***costs***
- ▶ Reflects low operating prices
- ▶ Expansion of supply historically limited by lagging revenues... lack political support for “tax fixes”
- ▶ Present pricing system doesn’t balance supply and demand... *result more commonly called* ***congestion***



Travel and land development connections

Regional travel, demographic, and land-use perspectives - past and present trends



Regional Travel Trends

*What's "driving"
regional travel
trends?*



Summary of Travel Trends 1995 Nationwide Personal Transportation Survey

December 1999

Patricia S. Hu
Center for Transportation Analysis
Oak Ridge National Laboratory

Jennifer R. Young
Systems Development Institute
University of Tennessee, Knoxville




U.S. Department
of Transportation

Federal Highway
Administration

Regional Travel trends...

Changes in National Demographics & Personal Travel: 1969 to 1995



Population growth (000) (Including Persons Age 5 and Under)	+31.8%
Annual Person Trips (000,000)	+161.1%
Annual Person Miles of Travel (000,000)	+142.9%
Number of Person Trips per Person	+98.0%
Annual Person Miles Traveled per Person	+84.3%
Average Person Trip Length (miles)	-5.6%

Regional Travel trends...

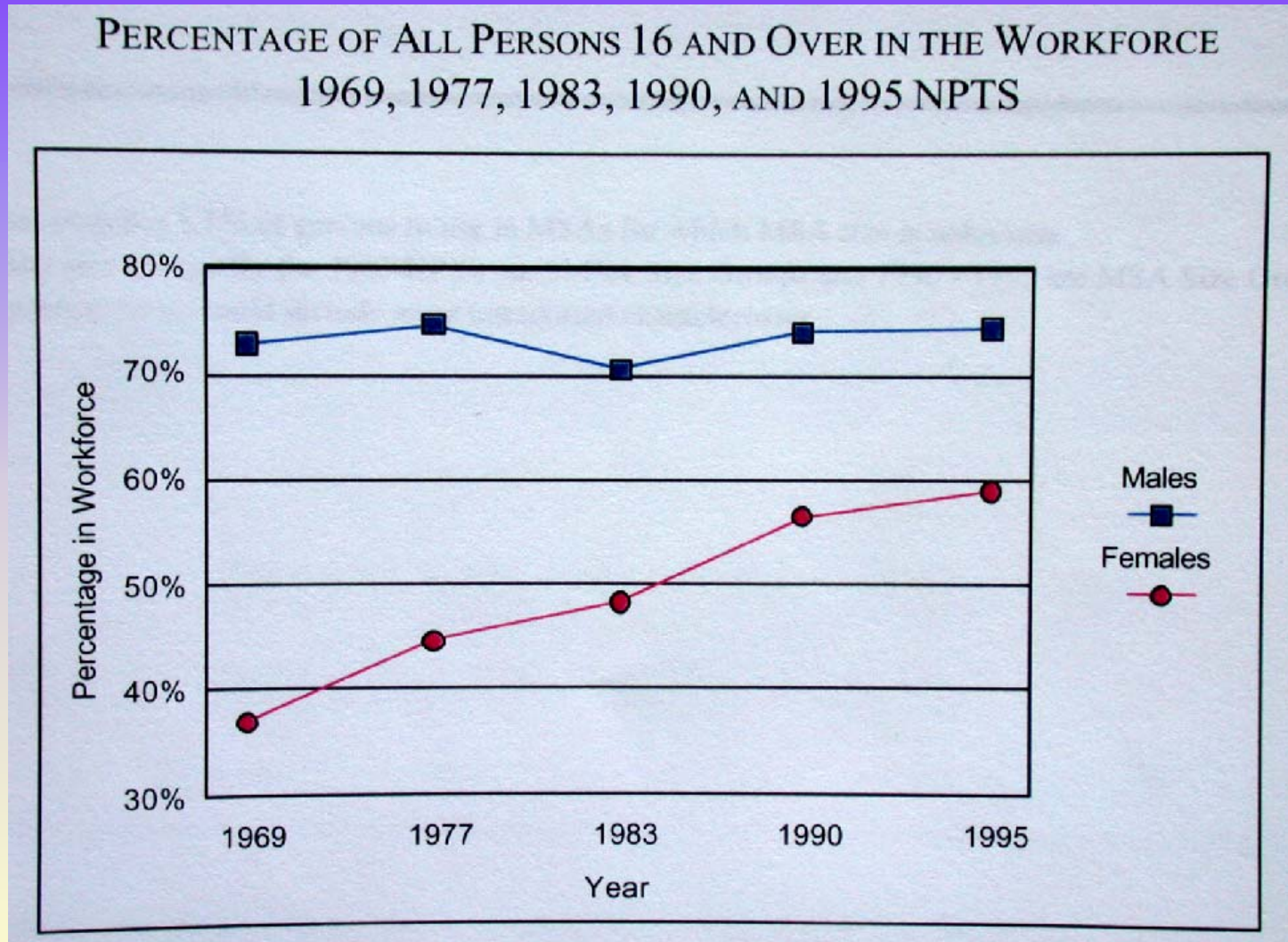
More travel per household

Table 5
Average Annual VMT, Vehicle Trips and Trip Length by Selected Trip Purposes
1969, 1977, 1983, 1990, and 1995 NPTS

Trip Purpose	1969	1977	1983	1990	1990 Adjusted	1995
Average Annual VMT per Household						
All Purposes	12,423	12,036	11,739	15,100	18,161	20,895
To or From Work	4,183	3,815	3,538	4,853	4,853	6,492
Shopping	929	1,336	1,567	1,743	2,178	2,807
Other Fam & Personal Business	1,270	1,444	1,816	3,014	4,250	4,307
Social and Recreational	4,094	3,286	3,534	4,060	5,359	4,764
Average Annual Vehicle Trips per Household						
All Purposes	1,396	1,442	1,486	1,702	2,077	2,321
To or From Work	445	423	414	448	448	553
Shopping	213	268	297	345	431	501
Other Fam. & Personal Business	195	215	272	411	579	626
Social and Recreational	312	320	335	349	460	427
Average Vehicle Trip Length (miles)						
All Purposes	8.90	8.35	7.90	8.98	8.85	9.06
To or From Work	9.40	9.02	8.55	10.97	10.97	11.80
Shopping	4.36	4.99	5.28	5.10	5.10	5.64
Other Fam. & Personal Business	6.51	6.72	6.68	7.43	7.43	6.93
Social and Recreational	13.12	10.27	10.55	11.80	11.80	11.24

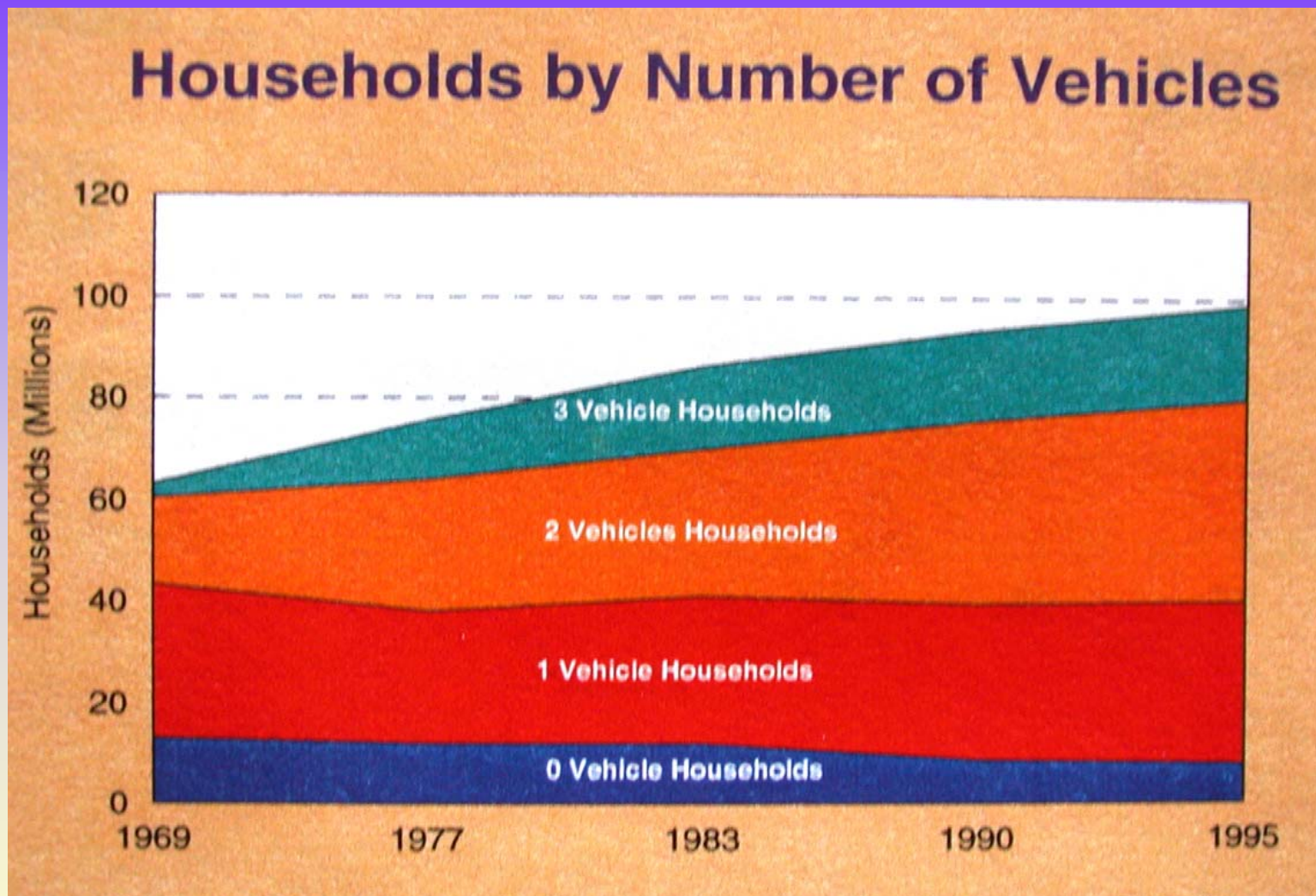
Regional Travel trends...

Part of story behind travel growth since 1960's



Regional Travel trends...


Households have more vehicles



Regional Travel trends...

Traveling to Work

Commute Profile



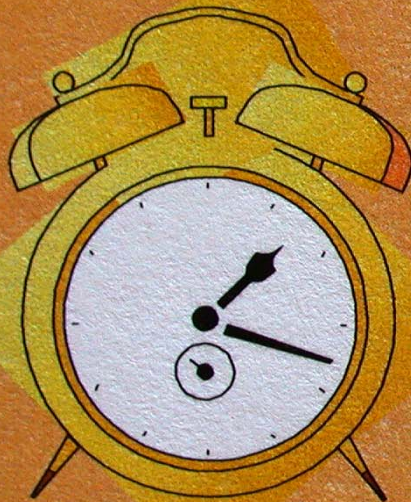
	1983	1990	1995	'83 - '95 % Change
Average Work Trip Length (Miles)	8.5	10.6	11.6	36.5
Average Work Travel Time (Minutes)	18.2	19.7	20.7	13.7
Average Work Trip Speed (MPH)	28	32.3	33.6	20

Regional Travel trends...

Daily driving time by age & sex

Daily Time Spent Driving

Includes all
auto trips



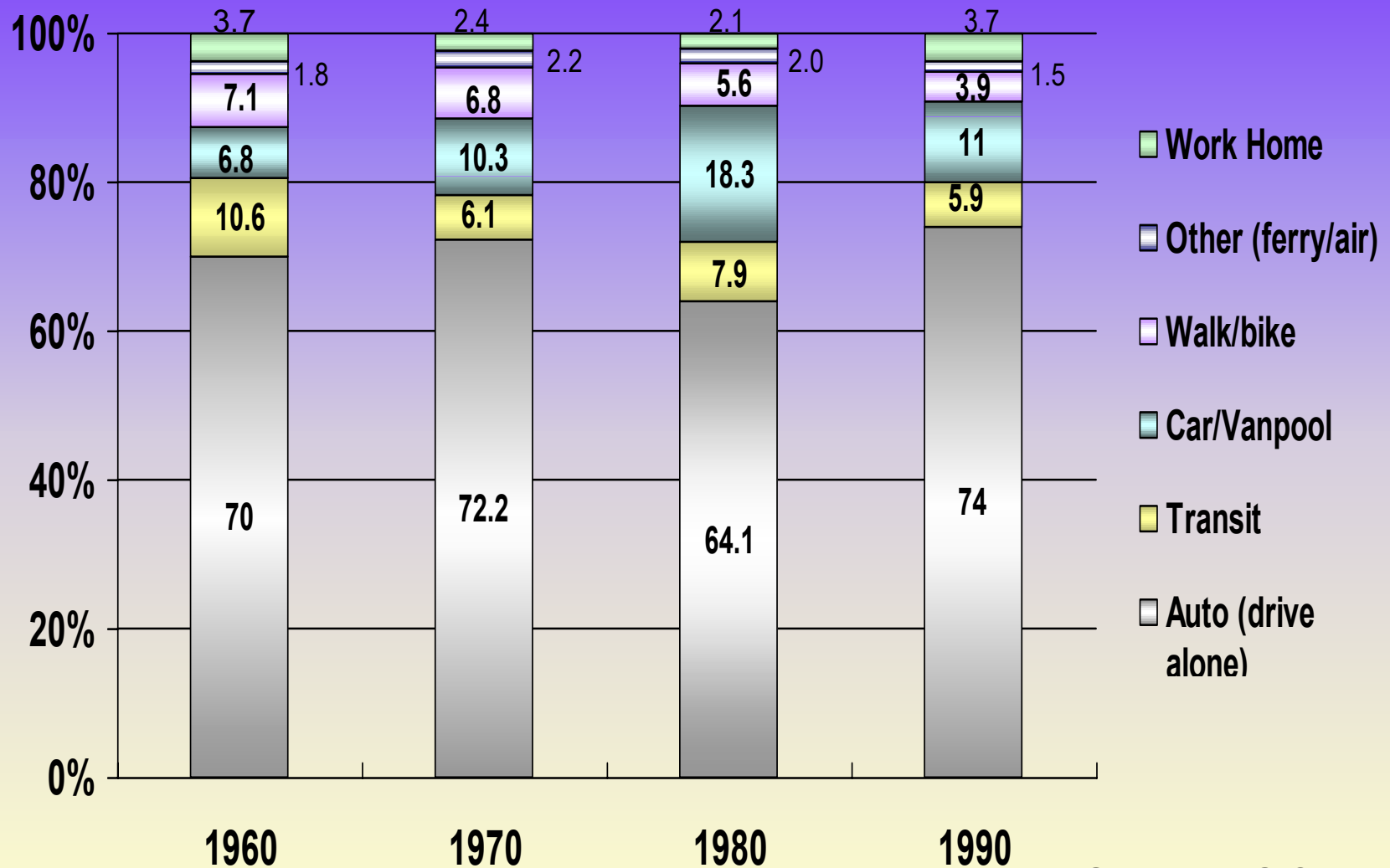
Average Minutes

Ages	Male	Female
16 - 19	57.7	56.1
20-34	80.7	65.4
35-49	85.5	67.4
50-64	87.7	61.1
65+	73.2	54.7
All	81.3	63.6

Mode of Travel to Work

Central Puget Sound *(by decade)*

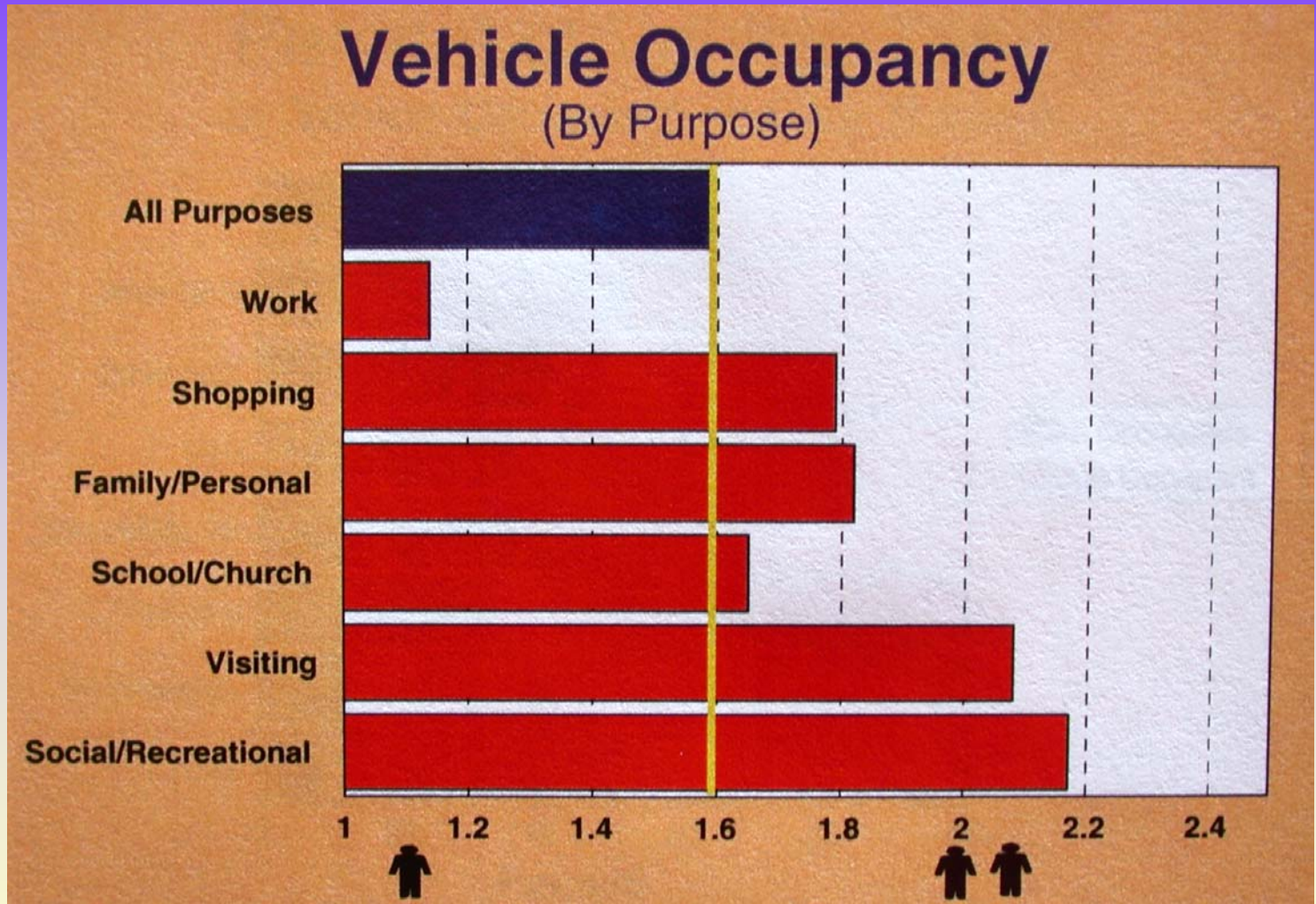
Proportional Travel by Mode for All Workers *(Includes work-at-home)*



Source: US Census

Regional Travel trends...

Sometimes we travel together



Does the land development pattern (land use) *really* impact how much we travel every day?

A tale of two regions...

Urban Form and Travel

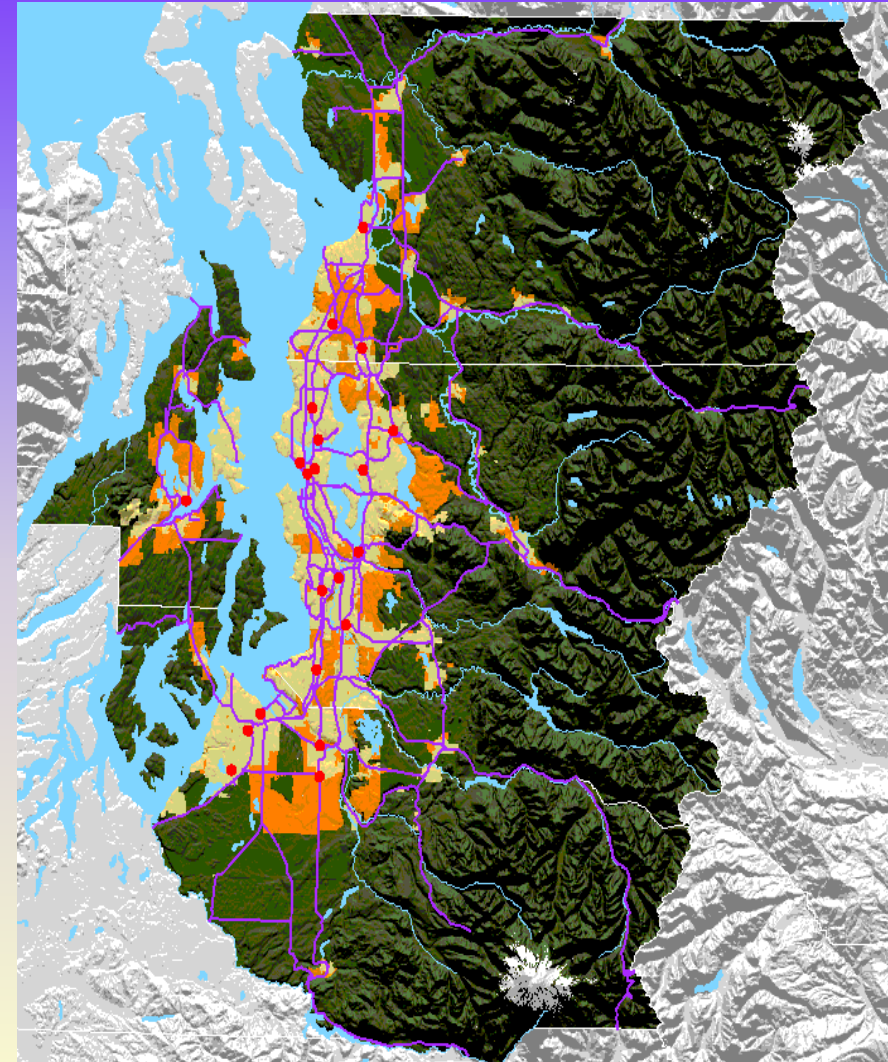
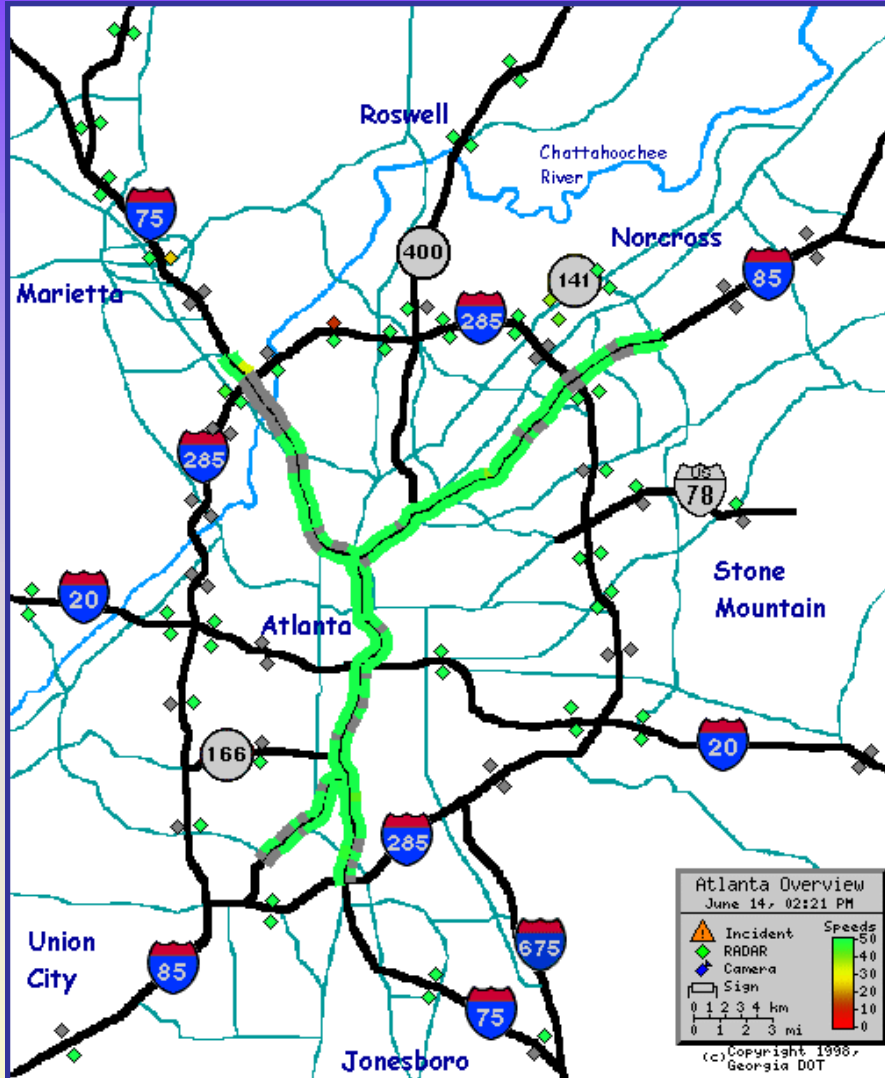
Atlanta Region

- Dynamic growth
- 3+ million people
- 6,100 sq. miles
- Est. 10 million daily person trips
- 100 million vehicle miles traveled (VMT) daily
- Air quality status: “**Serious**” (*non-attainment of standards*)
- Federal Highway \$ cutoff

Central Puget Sound

- Dynamic growth
- 3.2 million people
- 6,300 sq. miles
- Est. 10 million daily person trips
- 63 million daily vehicle miles traveled
- Air quality status: “**Maintenance**” (*conforms to standards*)

Comparative Demographics – Different Development Patterns



News about transportation

April 28, 2002

www.nytimes.com

The New York Times
ON THE WEB

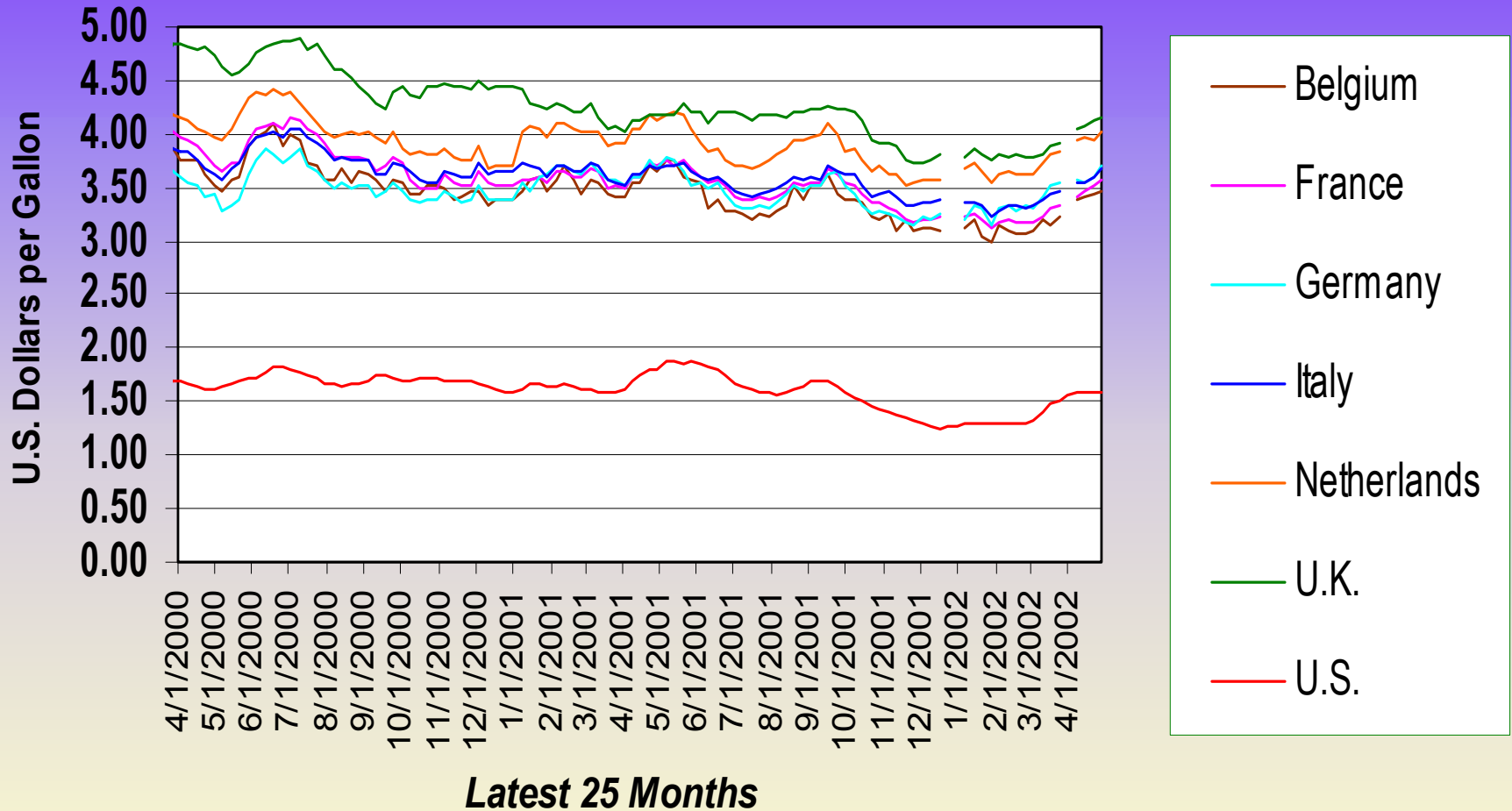
The Price of Going the Distance

- Gas prices jumped 23 cents a gallon in March – biggest in more than decade
- Fact - gas prices have remained remarkably low over the past 20 years
- Had they kept pace with inflation since 1982, price of gallon of gas today would be about \$2.45 – about a dollar more than consumers now pay
- Despite bargain-basement gas prices, transportation costs... up more than 50% in past decade
- Gasoline only 17% of household transportation expenditures... the rest is car itself

In most parts of country...

- People spend more on transportation than on medical care, education, clothing and entertainment --- combined.
- At least 7 metropolitan areas spend more on transportation than on housing

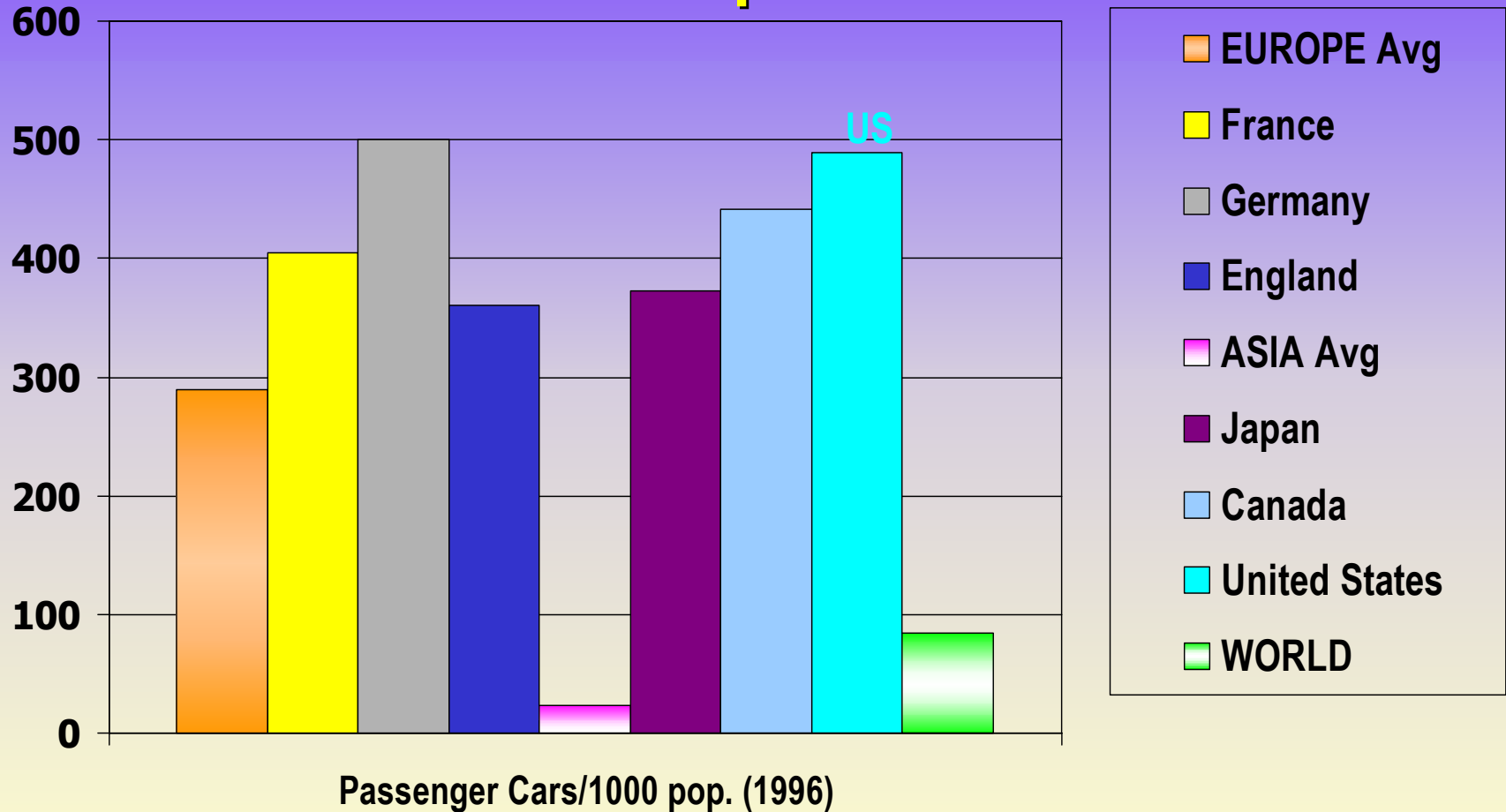
World Retail Gasoline Prices 2000-2002



International Perspective...

Transportation Resource Consumption

Autos Per 1000 Population

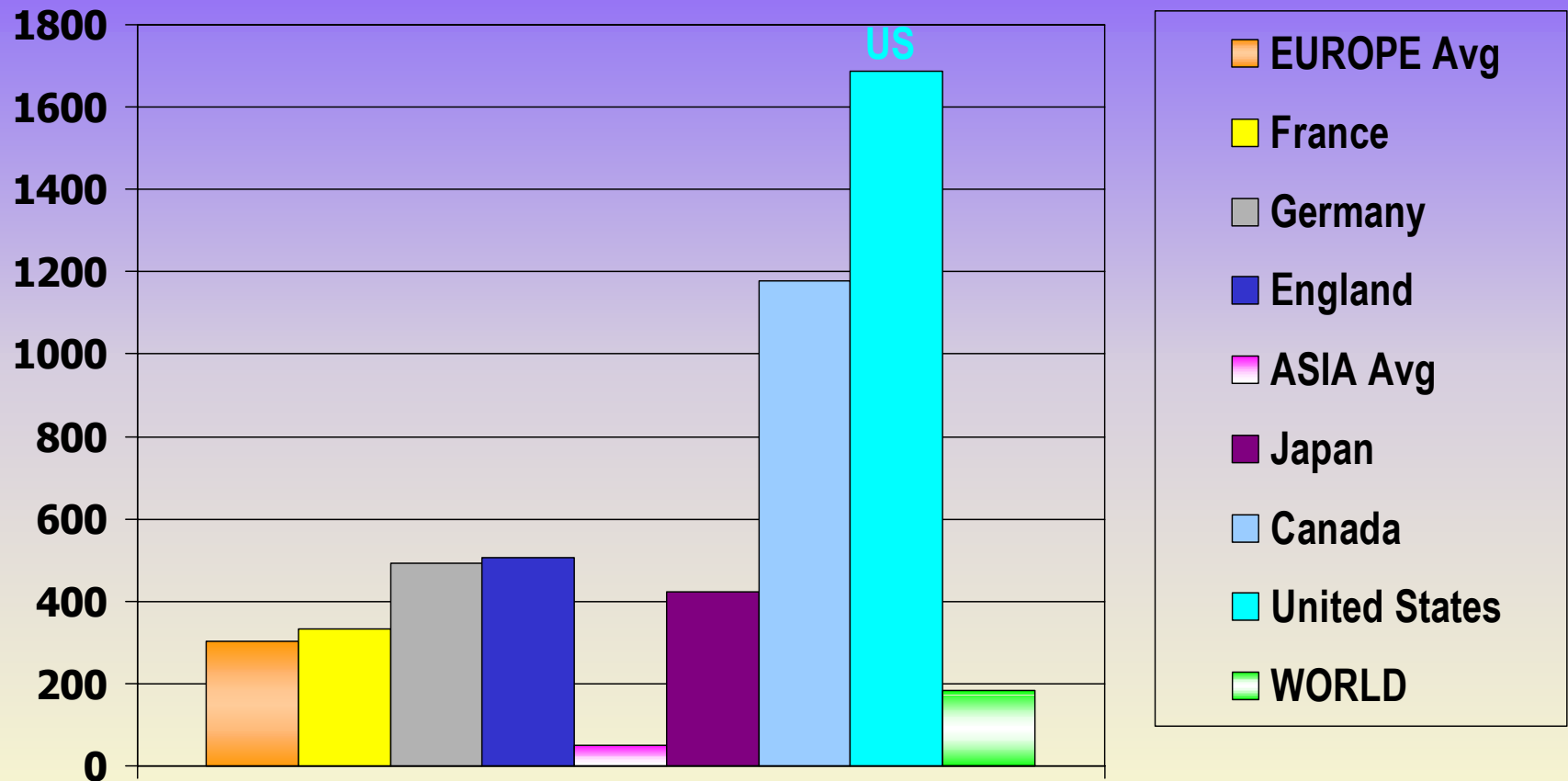


Source: US Dept. of Energy

International Perspective...

Transportation Resource Consumption

Annual Gasoline Consumed (Liters Per Person)



Annual Motor Gasoline- Liters/person (1997)

Source: US Dept. of Energy

More transportation news...

Wednesday, May 1, 2002

THE
ANN ARBOR NEWS

Automaker thinks green

- Neighborhood electric vehicles, gas-electric hybrid SUVs, military diesel-electric hybrid trucks, fuel cell powertrains - all are part of DaimlerChrysler's portfolio of environment-friendly vehicles.
- Most of the automakers are neck-and-neck in the race to produce commercially viable fuel cell vehicles, with many companies forging alliances to deal with the technological complexities of the concept.

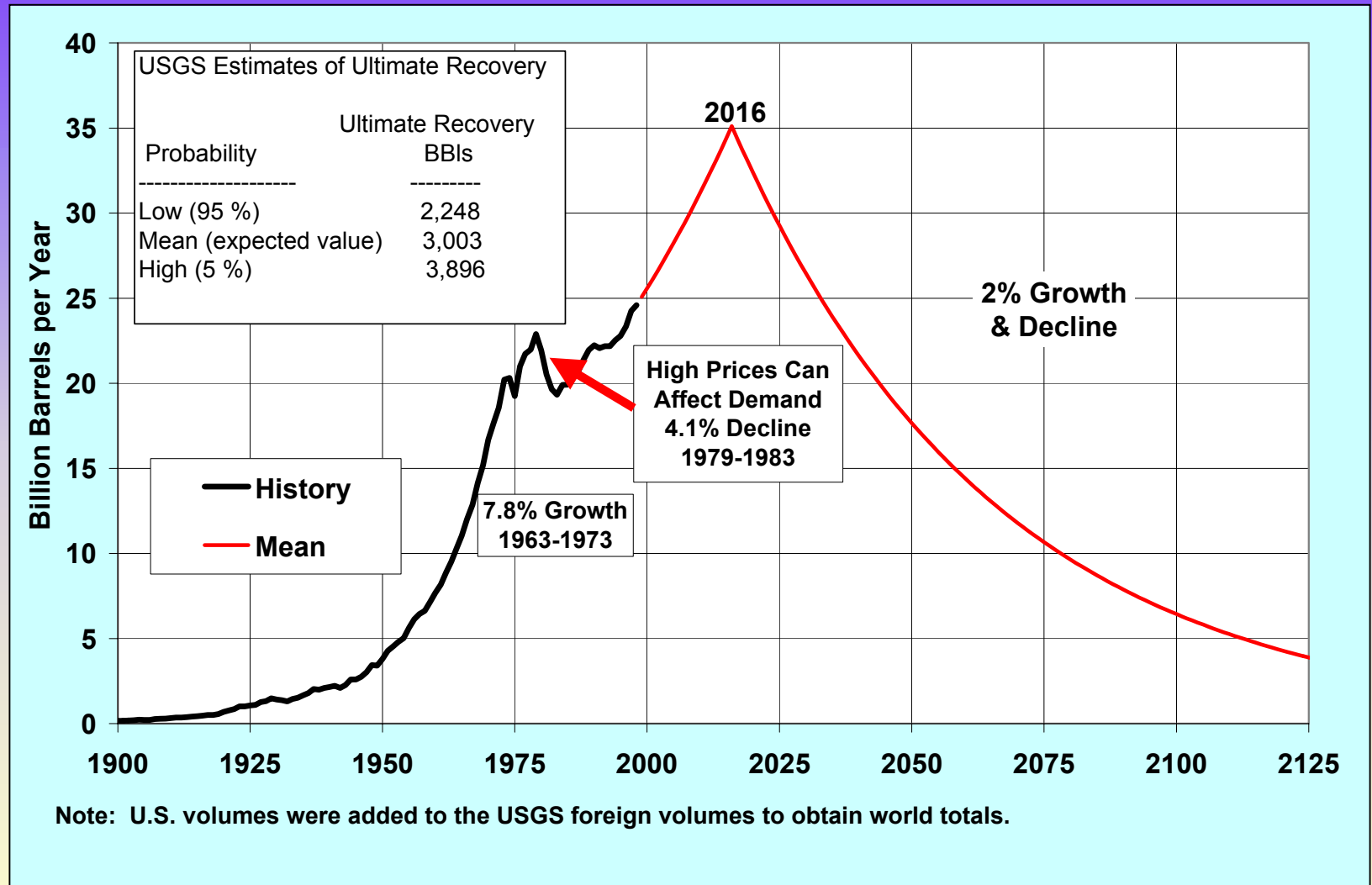
And the motivation for “green thinking” is....?

A Glance at What's Happening with a Key Travel Resource

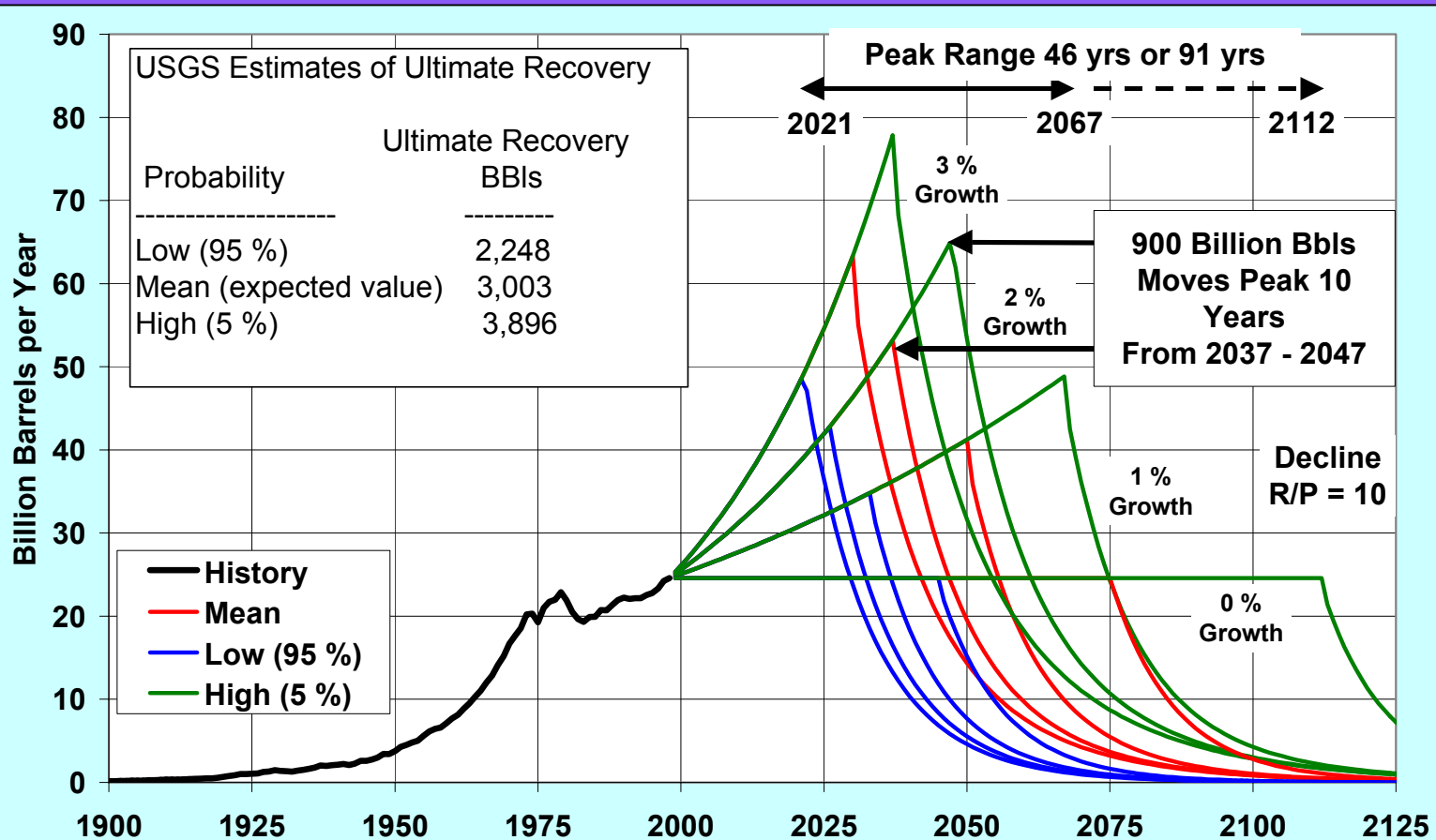
Long Term World Oil Supply (A Resource Base/Production Path Analysis)



Annual Oil Production with 2% Annual Growth & Decline Scenario



12 EIA World Conventional Oil Production Scenarios



Note: U.S. volumes were added to the USGS foreign volumes to obtain world totals.

Old lessons and new tools...

*Linking transportation investment & land use decisions
yields efficient travel and livable communities*

Federal Highway Administration (FHWA)

New Program...

Context Sensitive Design (CSD)



FHWA's new emphasis – States engage more locally

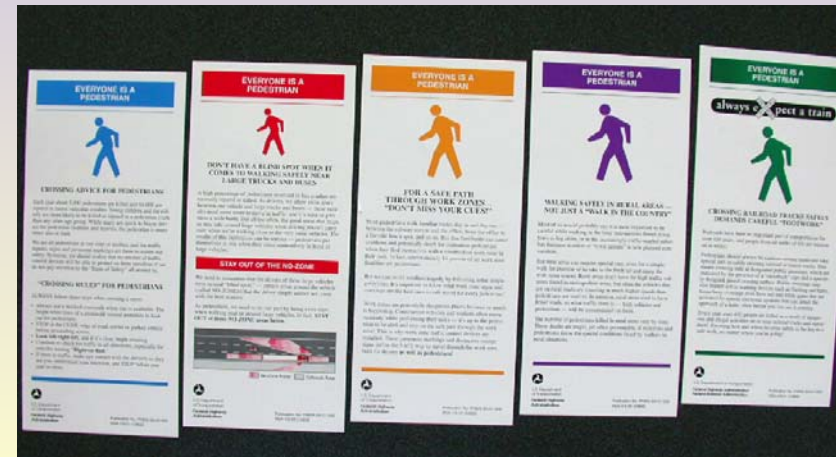
Geometric Design Practices for European Roads



International Technology Exchange Program • June 2001



U.S. Department of Transportation
Federal Highway Administration



CSD – Leading State DOT efforts...

WHEN MAIN STREET IS A STATE HIGHWAY



BLENDING FUNCTION, BEAUTY AND IDENTITY
A HANDBOOK FOR COMMUNITIES AND DESIGNERS

Parris N. Glendening
Governor

Kathleen Kennedy Townsend
Lt. Governor


Maryland Department of Transportation
State Highway Administration

John D. Porcari
Secretary

Parker E. Williams
Administrator

Maryland

Travel Demand Management



TDM...

...invisible Silver Bullet?

What *is* TDM?

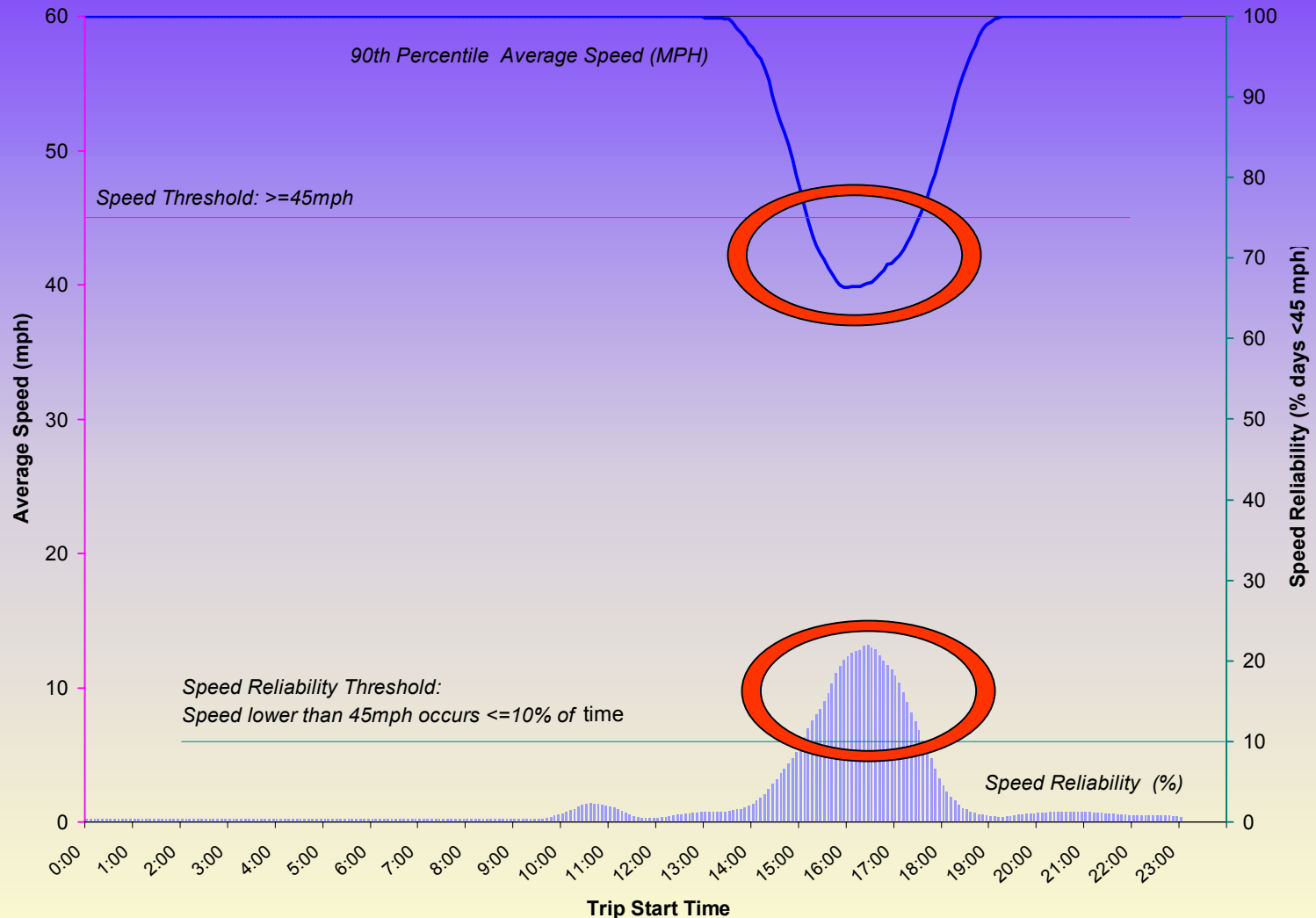
- ▶ **Good concept - dumb name**
- ▶ **It's about *travel conservation***
- ▶ **Broad menu of programs and approaches**
 - Objective: more efficient travel & help reduce single-occupant vehicle travel
- ▶ **Focus on key markets for tailored products and services... working with largest employers gets most effective short-term benefits**
 - Typical programs include at least vanpools, ridesharing, employee transit passes, encouragement and/or incentives to walk, bike or share ride to work... parking pricing & management

Focused TDM Opportunities

- ▶ Shifts in Peak periods
 - View selective examples of corridor congestion
- ▶ Changes in Travel Mode
 - Understand and ***focus*** on ***market*** opportunities
- ▶ Reality of Travel Costs
 - Understanding, communicating and making real costs part of solution

North I-5, Northbound

Northbound, Northgate to 112th St SE (15.1 miles)

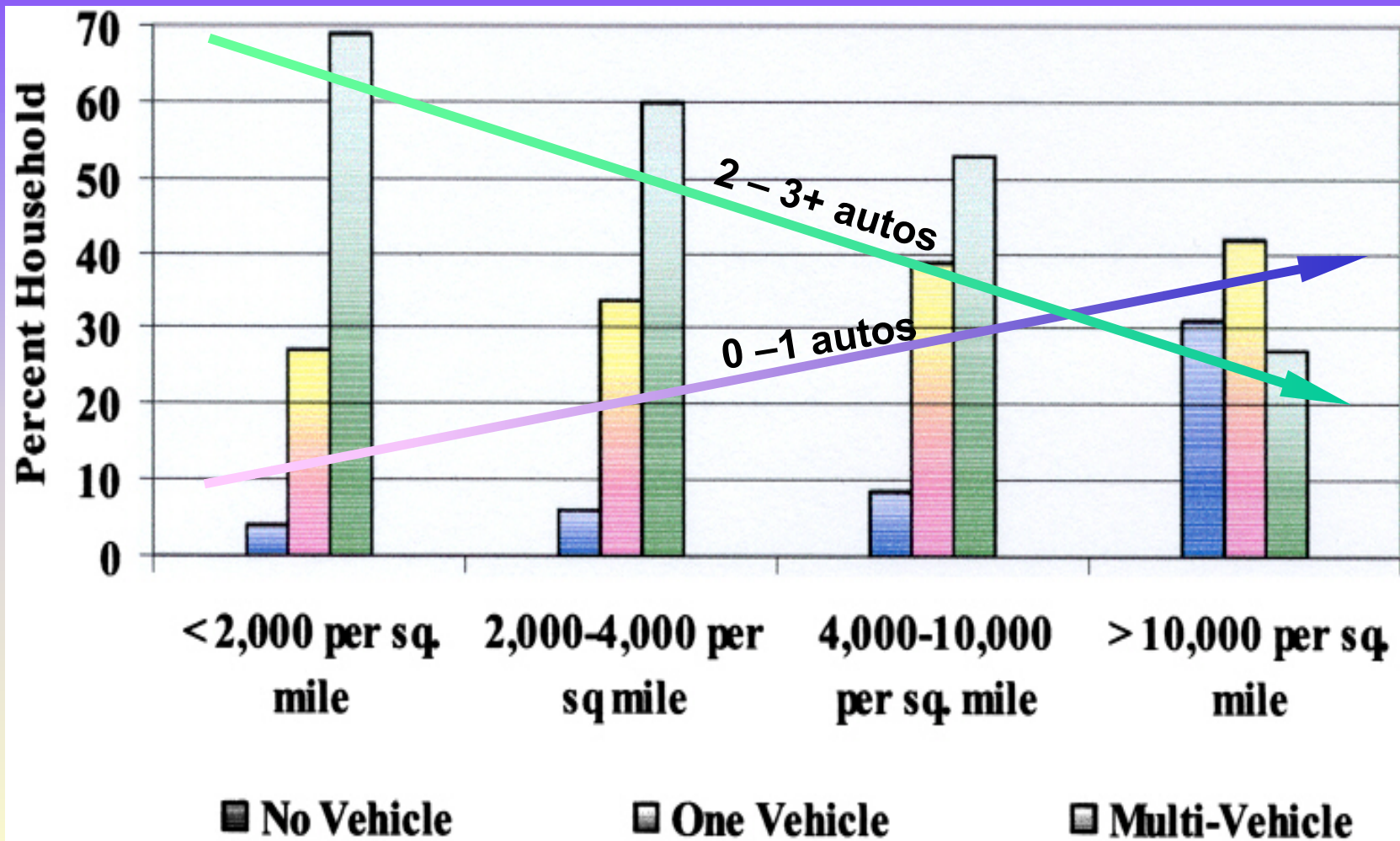


Know the Travel Market

**Smart planning tailors solutions to
unique community character...
one size does not fit all!**

Regional Travel Trends...

**As population density increases,
auto ownership decreases**

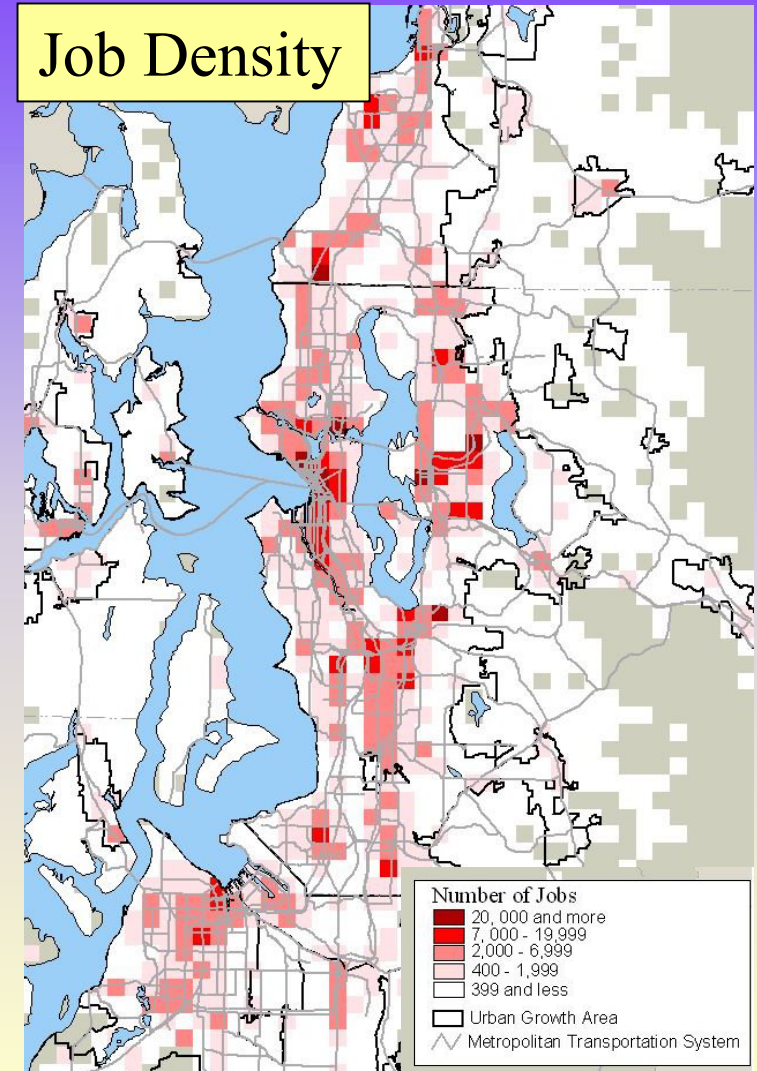
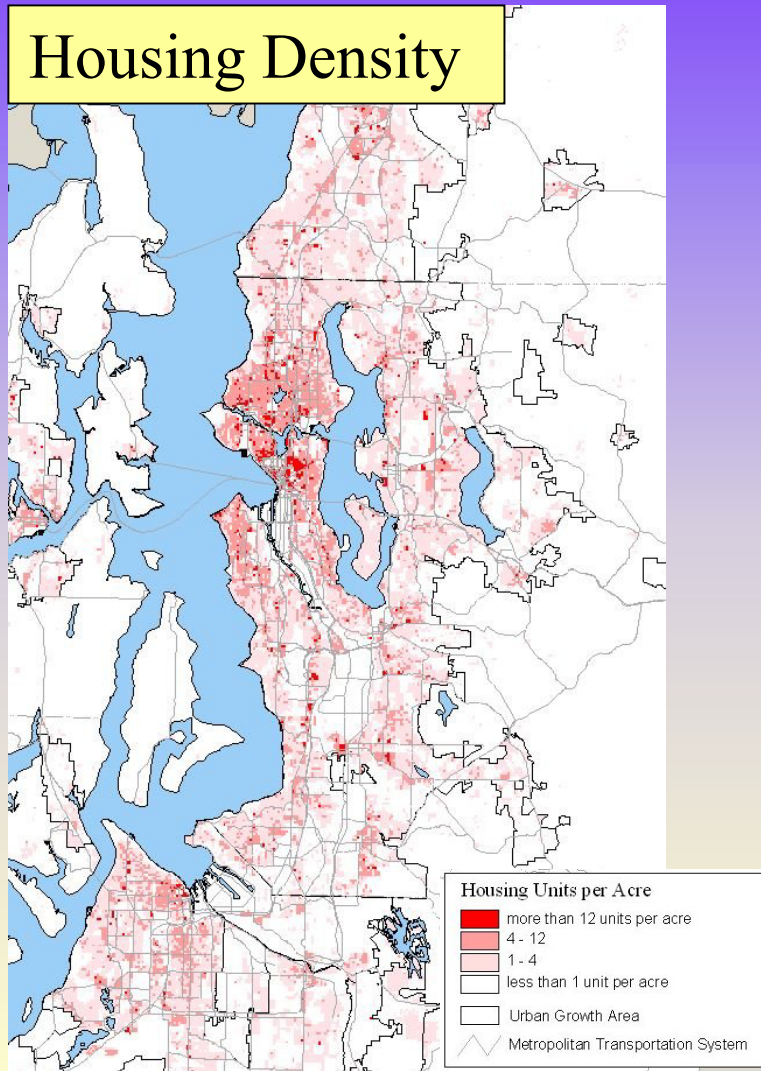


Regional Travel trends...

Few more facts about travel market

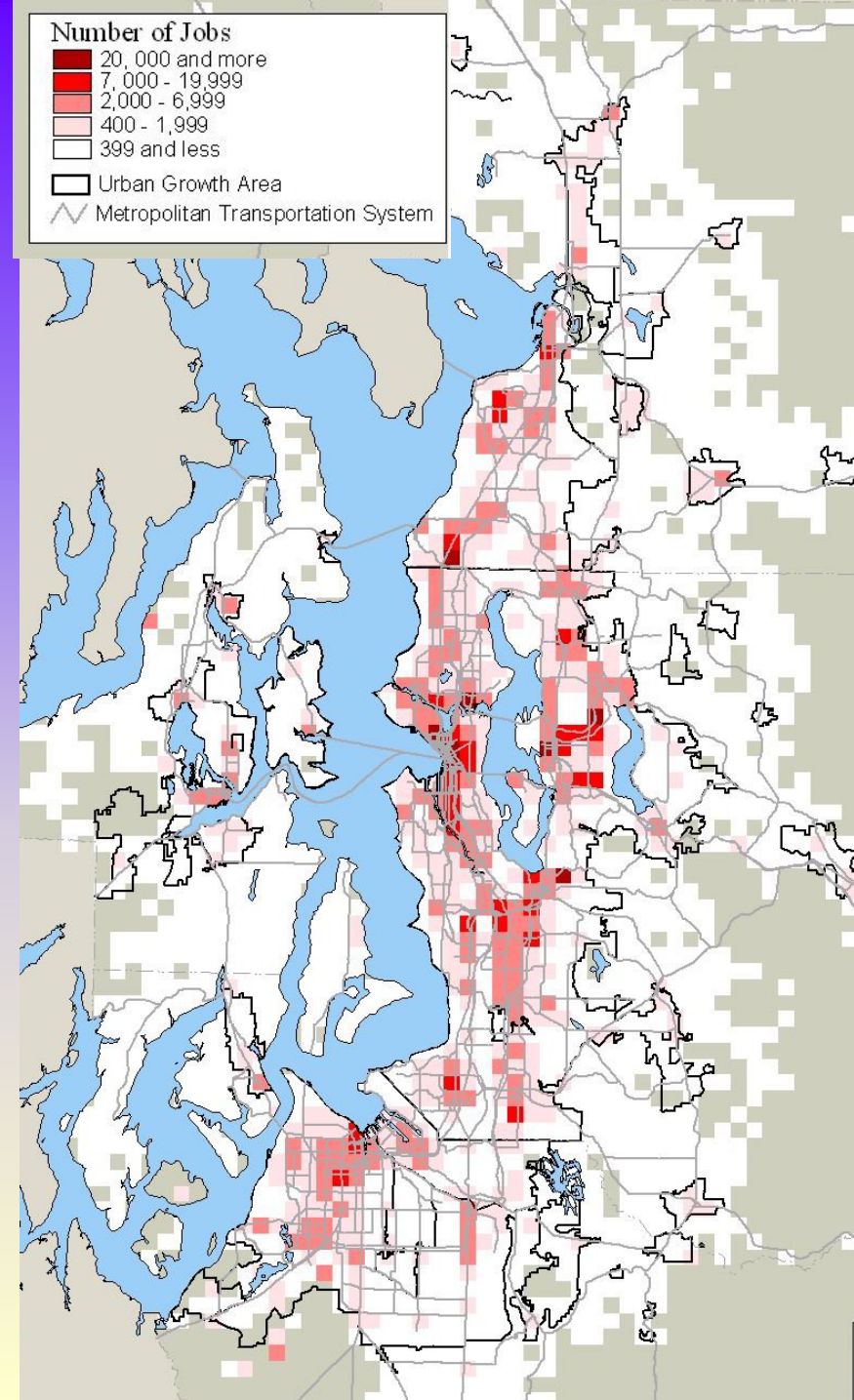
- ▶ **Work trips now less than 20% of total daily trips in metropolitan area... *Shouldn't plans deal with the other 80%?***
- ▶ **Half of *all* auto trips are less than 5 miles**
- ▶ **16% auto trips less than 2 miles**
- ▶ **Of all trips of less than 1/2 mile, *one-third* are by auto**

GIS - Graphic Tools Help Understand and Analyze Markets

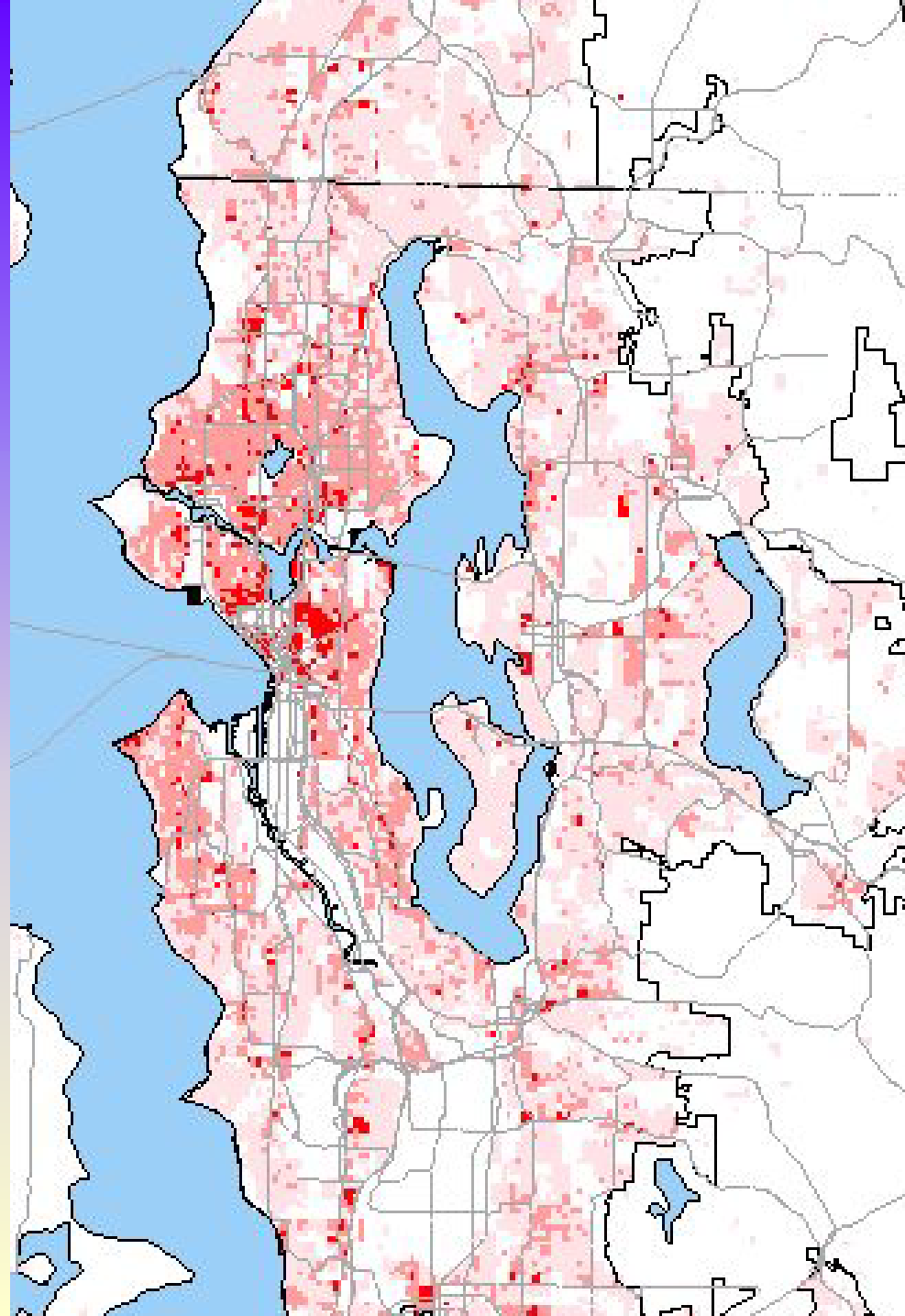


Where's the action?

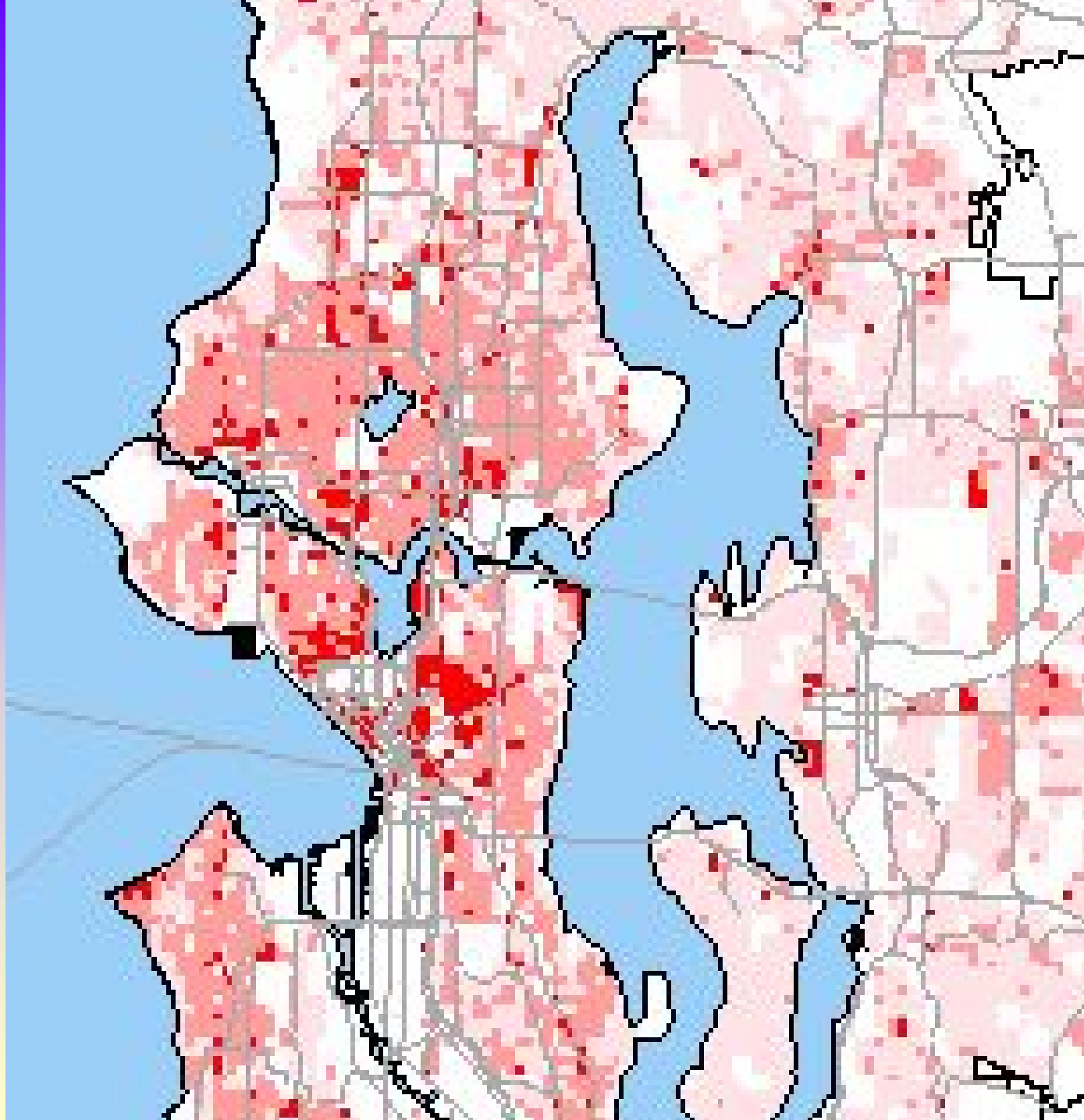
Find concentrations of people and jobs to develop cost-effective solutions



**Zoom in to identify
demographic
market for best
transportation
solution...**



**And even
closer as
needed...**



Market for Transit and Alternative Travel

Existing - 1998

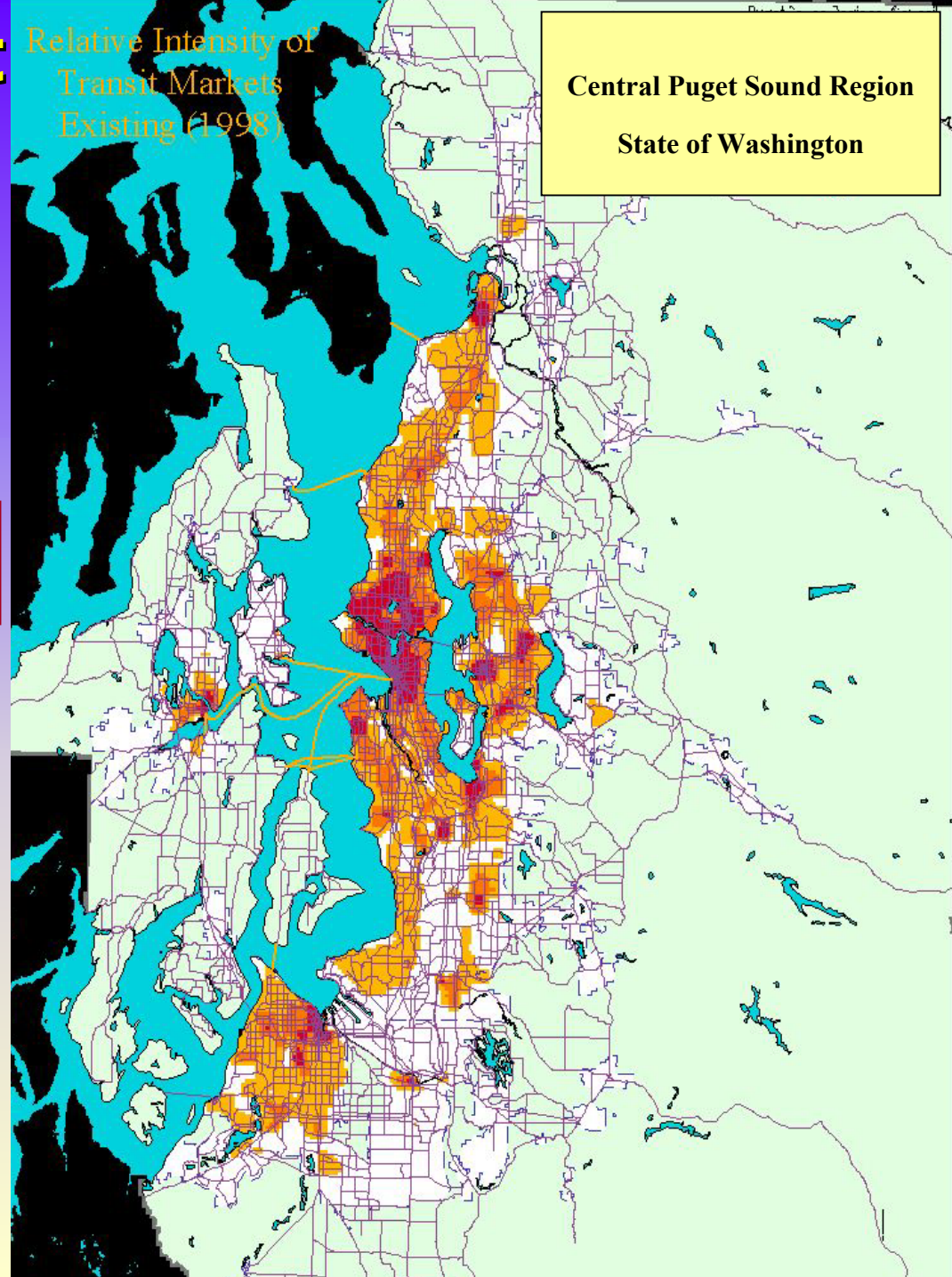
Relative density of *combined*
regional population and
employment concentrations



Darkest colors show highest
concentrations

Relative Intensity of
Transit Markets
Existing (1998)

Central Puget Sound Region
State of Washington



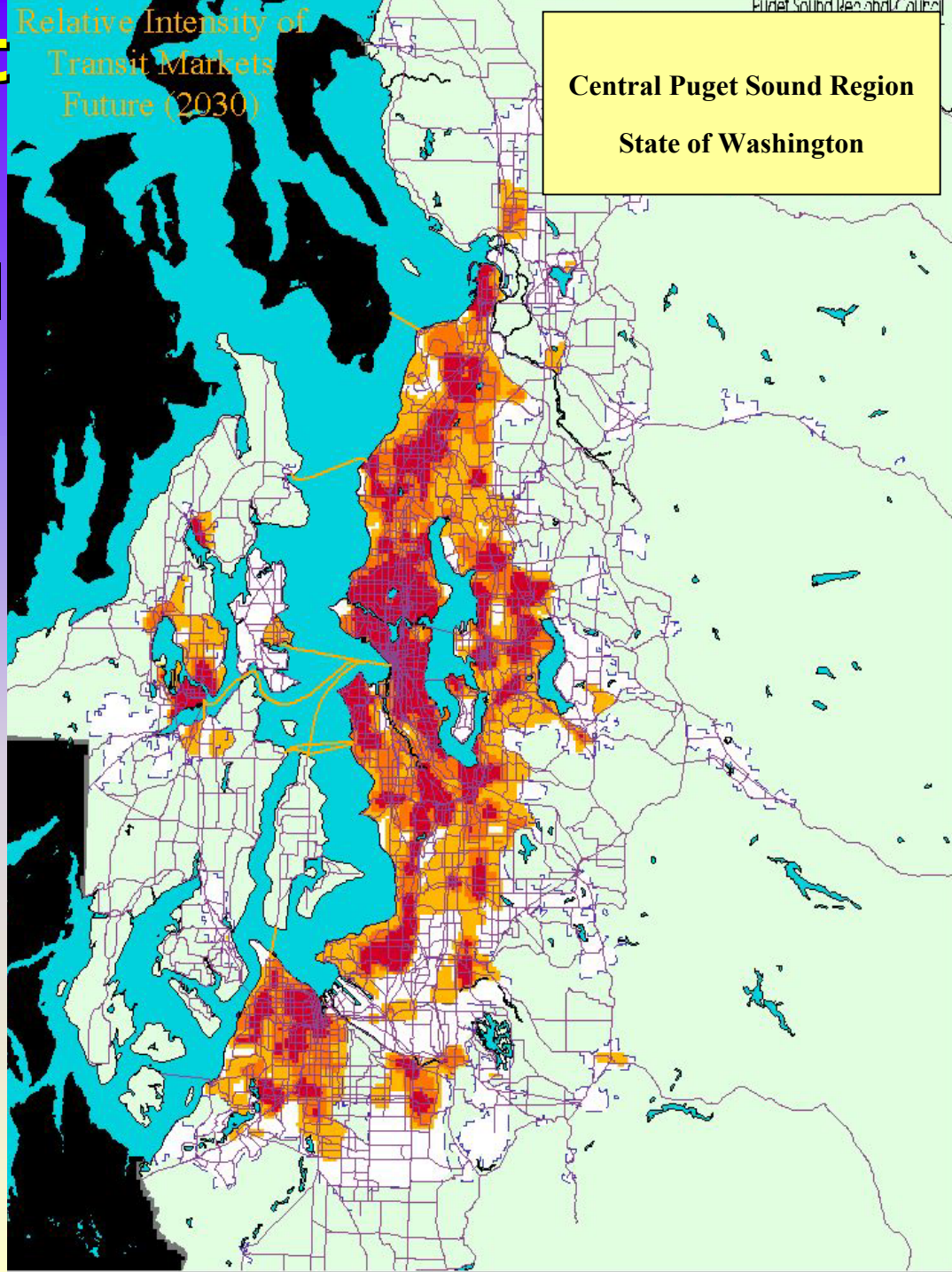
Market for Transit and Alternative Travel

Future - 2030

Relative density of
combined projections of
regional population and
employment concentrations



Darkest colors show highest concentrations

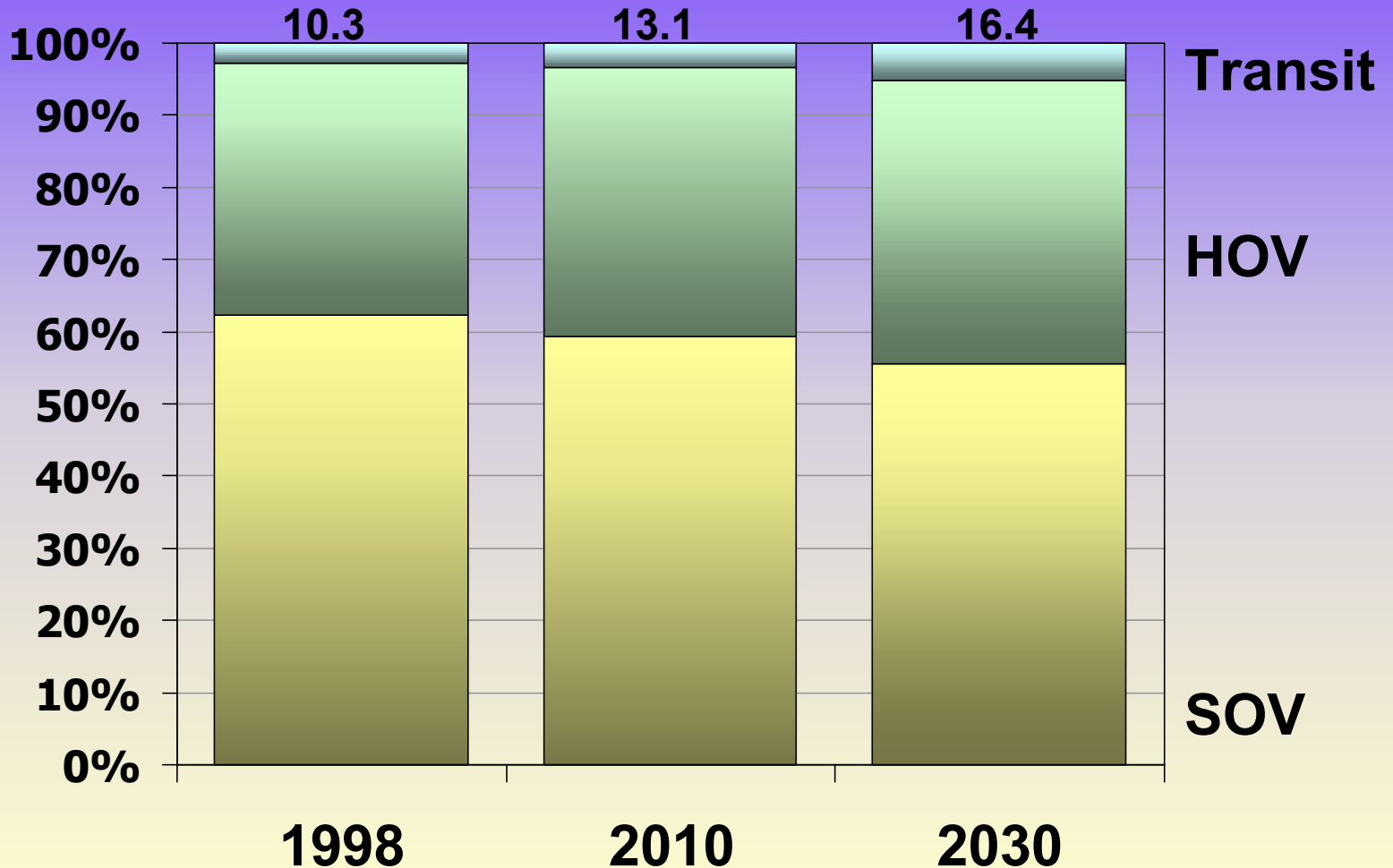


Total Daily Trips

Central Puget Sound Region

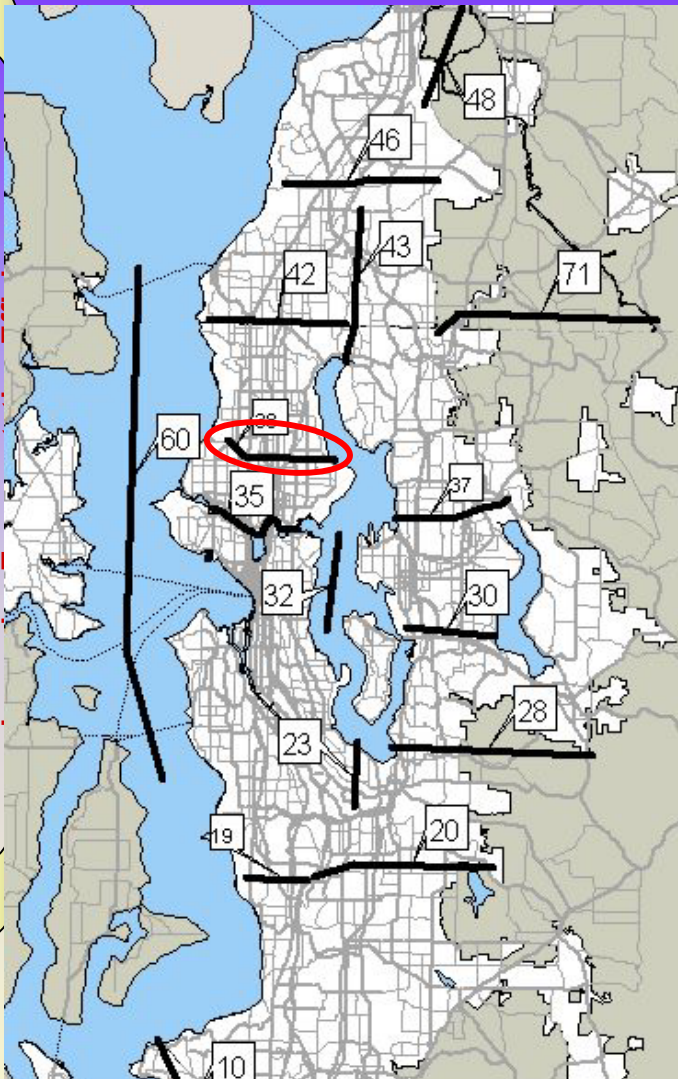
Much distinction?

Millions of Total Daily Trips by Travel Mode

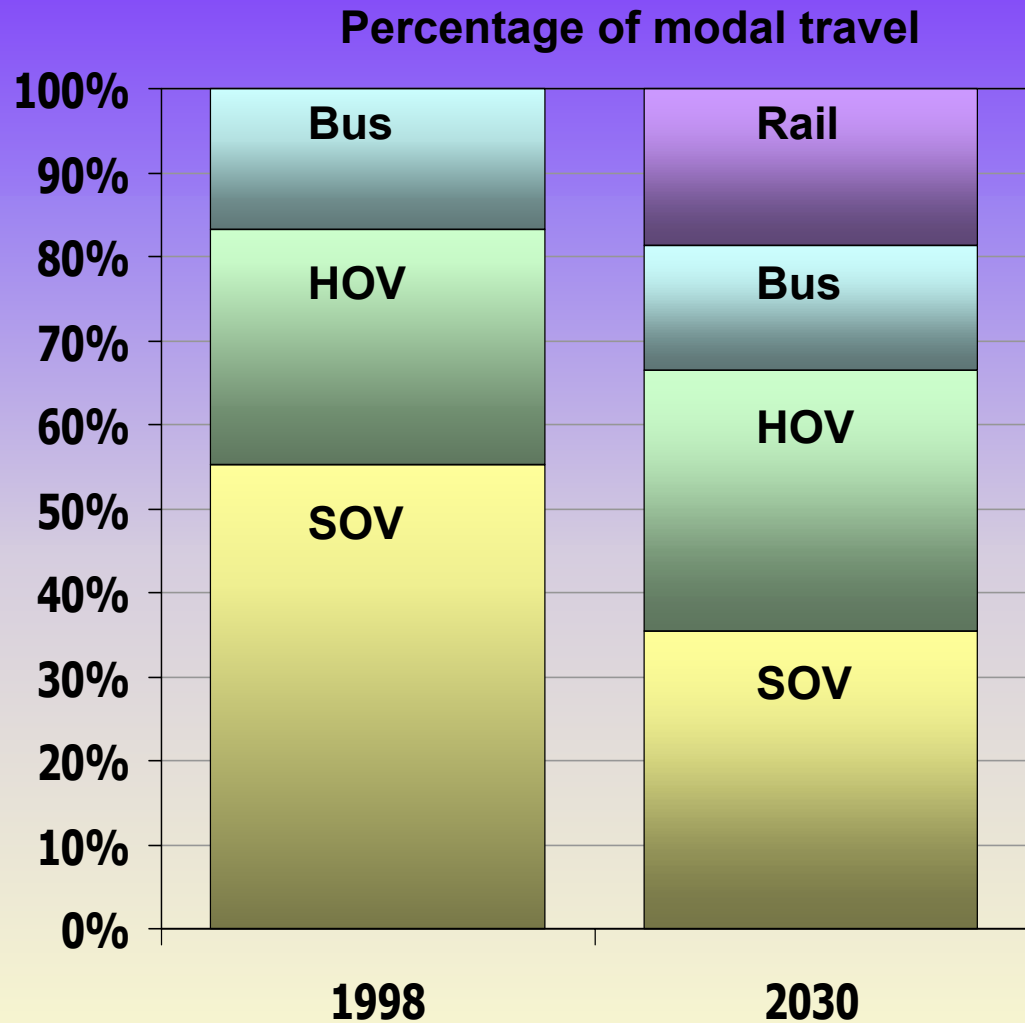


Ship Canal Corridor Travel

AM Peak Period (screenline) More strategic and *relevant...*



Central Puget Sound



Traffic Calming and System Management

**The *future* is learning
from the *past***

Managing Traffic Flow

*...for vehicles **and** people*

Improving Transportation Efficiency



Context Sensity Design for Traffic Safety & Community Enhancement

Improving Transportation Efficiency



Roundabouts

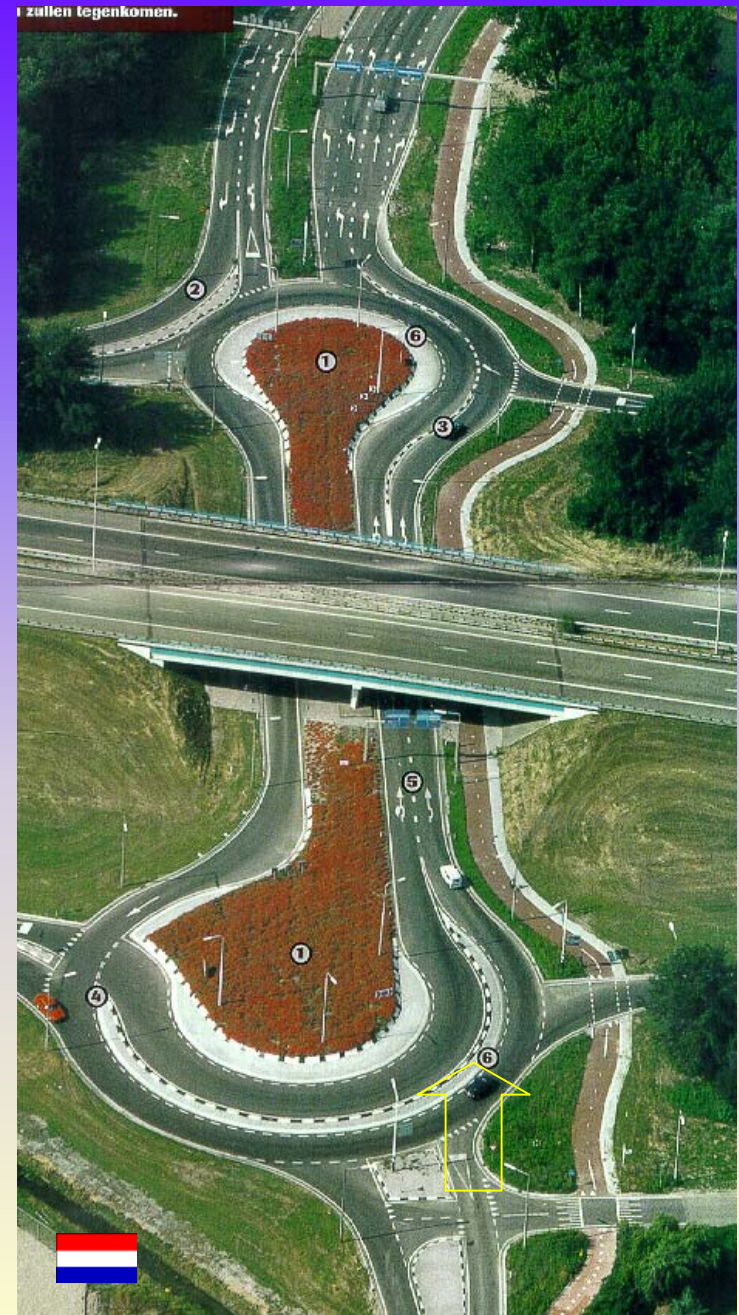
- Extensive use in all countries
- Safety and capacity gains
- Single and multiple approaches
- Flexibility to accommodate site specific conditions



More roundabouts



And they can get BIG too for large volumes



Use of Color and Texture for "Self explaining" Roadways and Pedestrian Spaces





Integration of all modes and users in the same space

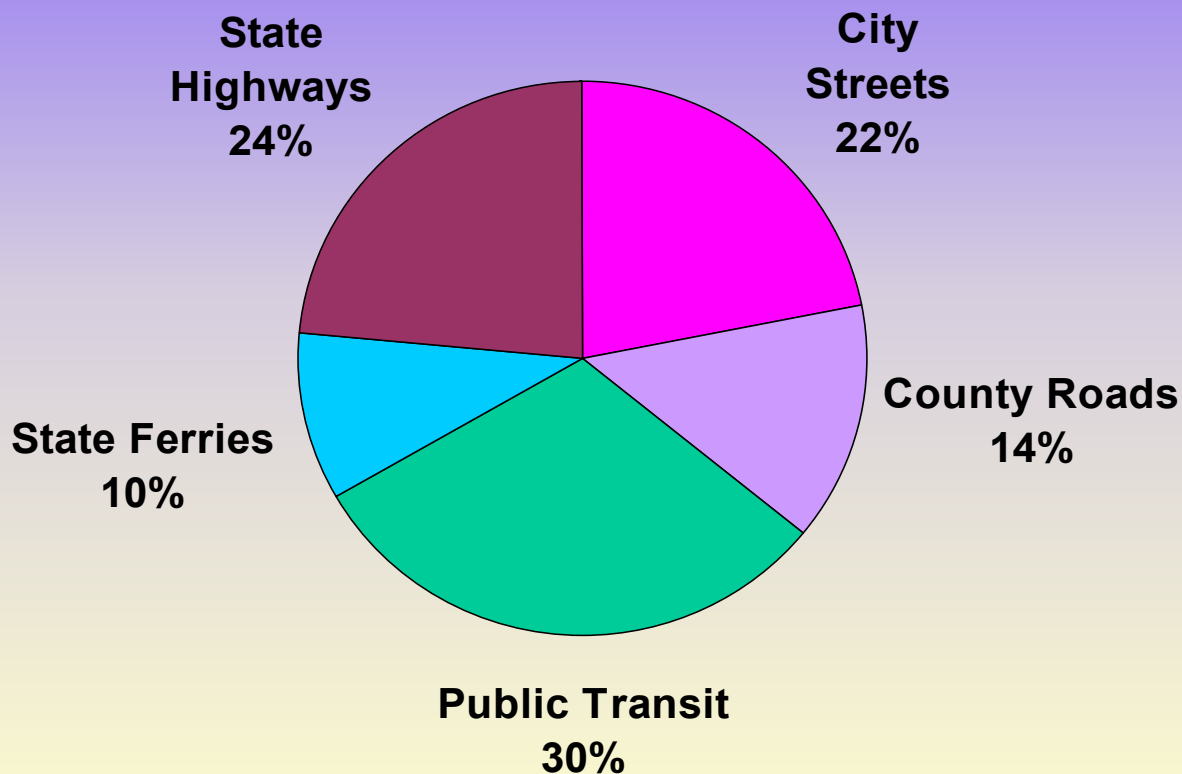


Talking About Money...

Moving towards business and market approaches to pay for regional travel

Regional Transportation Expenditures by Mode

**Proportional Annual Expenditures in Central Puget Sound
\$1.7 Billion Total - 1996 Data**

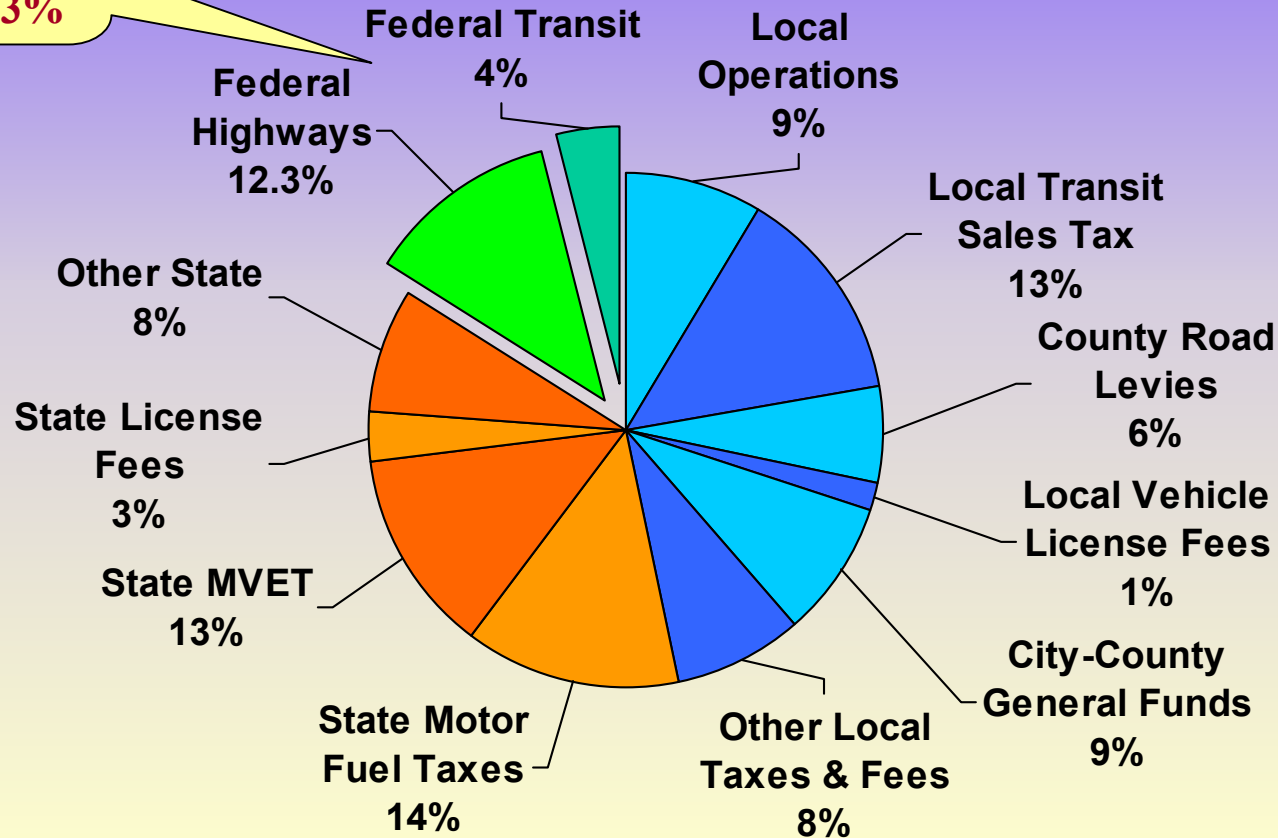


Regional Transportation Revenues by Source

Proportional Annual Revenues in Central Puget Sound

\$1.7 Billion Total - 1996 Data

combined
federal share
= 16.3%



Another Perspective on Costs of Transportation



The Real Transportation Price Tag

1998



Expenditure

\$billions %of total

private auto ownership and operation

16.3

62%

freight (moving goods and services)

6.4

24%

bikes, bus and ferry fares, etc.

0.2

1%

congestion/pollution

1.2

5%

roads, transit, ferries and other services
provided with the taxes we pay

2.1

8%

Total

\$26.2billion

Making Sense of Transportation Costs



**Better Management with
Total System
and Market Perspective**



The Case for Use-based Pricing



- ▶ Finance transportation investments and recover costs
- ▶ Improve performance through traffic management and congestion reduction
- ▶ Achieve environmental objectives such as air quality improvement

Road Financing...*today*

Conventional road financing is a tragic death-spiral

- Levy low charge on all mileage...
...creating excessive congestion during peak periods
- Congestion prompts road authorities to build and/or expand roads
- Low charges don't cover costs...
...another fun round of *popular* tax debates begins!



Value Pricing & Road Finance

Value pricing *stops* the death-spiral

- Charges are levied selectively on certain vehicle-miles
- Prices control excessive congestion during peak periods
- Value pricing generates revenue to build capacity when it's really needed
- Revenue is collected from those who use, benefit and burden capacity



How Do We *(should we?)* Look at Value Pricing?

► Economists:

- “The practice of setting road user charges to reflect all of the costs imposed by the user”

► Real people:

- “A way for people to buy their way out of congestion”
- “A way to keep traffic flowing at a reasonable speed”
- “A way to reduce auto use and increase transit use”
- “A method for financing road improvements and other neat stuff”
- “A way to reduce the need for expensive new roads that fracture communities”

Changing How We Raise and Spend Transportation Dollars

- ▶ Pricing must be part of a comprehensive transportation and land use strategy
- ▶ Prices and fees should achieve societal benefits and raise revenues
- ▶ Variable roadway pricing produces greatest congestion reduction benefits
- ▶ Implementation should be phased over time
- ▶ It is essential to invest in mobility alternatives

Challenge — Realigning a Juggernaut

Political appetite weak, but growing

- Value pricing has stronger foundation than other options... ***business, market & common sense***
- But it *still* continues to be easier to regulate with taxes than price with the market

Public perceptions

- Mistrust of policy makers to properly spend money
- Important to consider “hold harmless” approaches

Critical to gain public ownership of projects

- Public must be aware of user benefits of value pricing
- Policy makers must be aware of superior fiscal and traffic management opportunities & results

In summary, grasp the big picture

Transportation and land use have always been linked – now make it intentional for public benefit

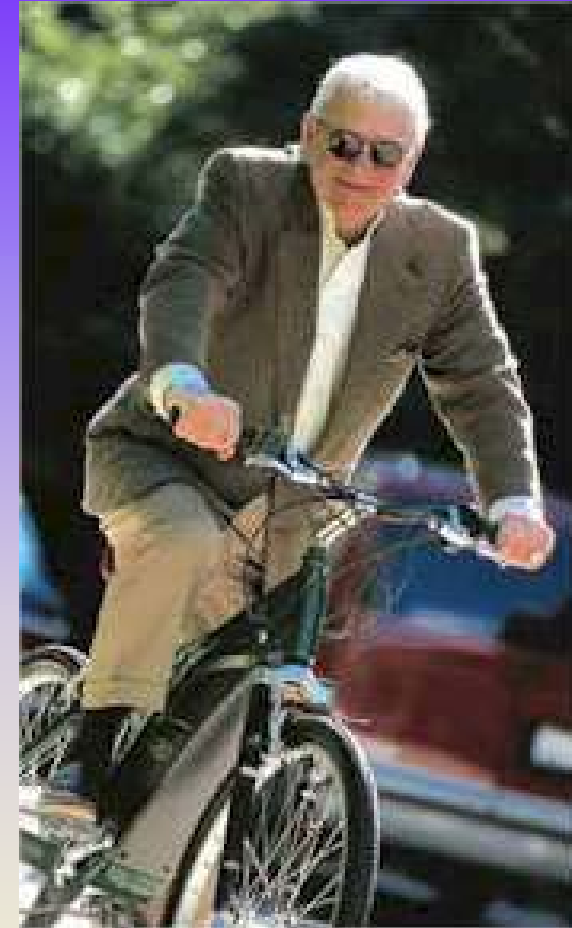
Signs of the times... recent bumper sticker...



More signs of changing times...



And a few more...



***Don't look now, but Lee Iacocca,
"Mr. Ford & Chrysler," is
selling Electric Bikes***

A close-up photograph of a flowering branch, likely a cherry or similar species, with numerous small, vibrant pink blossoms. The flowers are arranged in dense, drooping clusters. Interspersed among the blossoms are several green, serrated leaves. The background is softly blurred, showing more of the same plant and some hints of other colors like purple and red, suggesting a garden setting.

**Thank you...
questions?**

References – access to topical documents and data via internet websites*

- ▶ **Bureau of Transportation Statistics – BTS (USDOT- wide variety of travel and demographic data – national and for metropolitan areas)**
 - bts.gov
- ▶ **Context Sensitive Design - CSD (FHWA – new emphasis for integrating community interests in roadway design)**
 - fhwa.dot.gov/csd/index.htm
- ▶ **Maryland State Highway Administration – Main Streets and State Highways**
 - marylandroads.com/ohd/MainStreet.htm
- ▶ **Oregon State Department of Transportation – Main Streets Handbook**
 - lcd.state.or.us/tgm/pub/mainst/MSH.pdf

*Note - Weblinks all preceded by <http://www>. (then add link)

References* — *(continued)*

- ▶ **Traffic Calming - State of the Practice (FHWA & ITE)**
 - ite.org/traffic/index.html
- ▶ **Traffic Calming – Info about one day seminar (FHWA & ITE)**
 - ite.org/traffic/tcseminar.htm
- ▶ **Project for Public Spaces (PPS - their CSD site)**
 - pps.org/CSS/cssonline.htm
- ▶ **US Dept. of Energy (USDOE) – Center of Excellence for Sustainable Development**
 - sustainable.doe.gov/index.shtml
- ▶ **USDOE – Key Transportation Planning Principles to Maximize transportation choices (transit, bike, ped, TDM, etc.)**
 - sustainable.doe.gov/transprt/maxchoic.shtml#TDM
- ▶ **Victoria Transport Policy Institute (B.C., Canada) - Online TDM Encyclopedia**
 - vtpi.org/tdm/
- ▶ **Puget Sound Regional Council – (Seattle MPO)**
 - psrc.org

*Note - Weblinks all preceded by <http://www.> (then add link)

